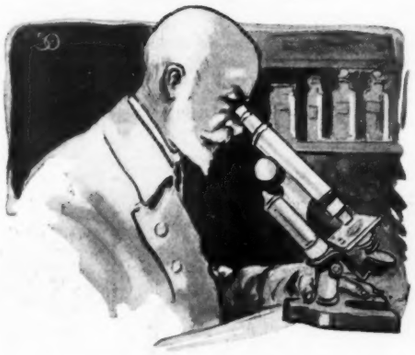
VOL. XXXII NEW YORK—THURSDAY, APRIL 8, 1915—CHICAGO No. 14

The AUTOMOBILE



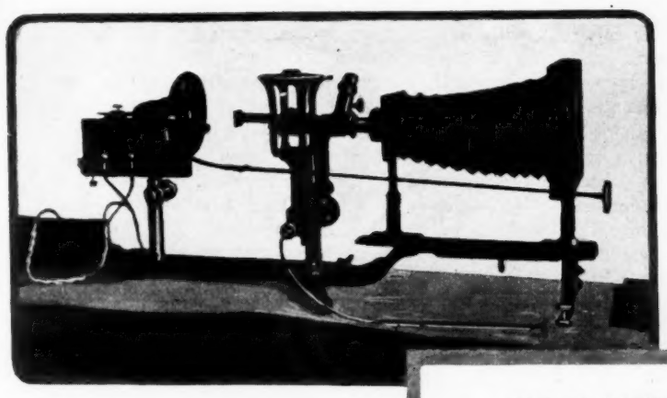
Microscopic study of tissue reveals the uses of medical and surgical agencies in correcting impurities in the human system

Steel—Its Pathology

Part 1—Iron, Carbon, Manganese and Impurities Always Present

By J. Edward Schipper

Part I—Original Composition
Part II—Alloys for Special Work
Part III—Heat Treatment
Part IV—Practical Selection



Microphotographs of steel specimens reveals the uses of alloys and heat treatment in strengthening structure of steel

IN the dim recesses of the pathological laboratory the scientist carefully focusing his microscope on a film of human tissue strikes at the very root of the reason for all medical practice. It is his research that guides the surgeon's knife, the practitioner's prescription book and leads the student to a comprehensive knowledge of what can be done to cure the human being of his ills and to lengthen his stay upon the earth.

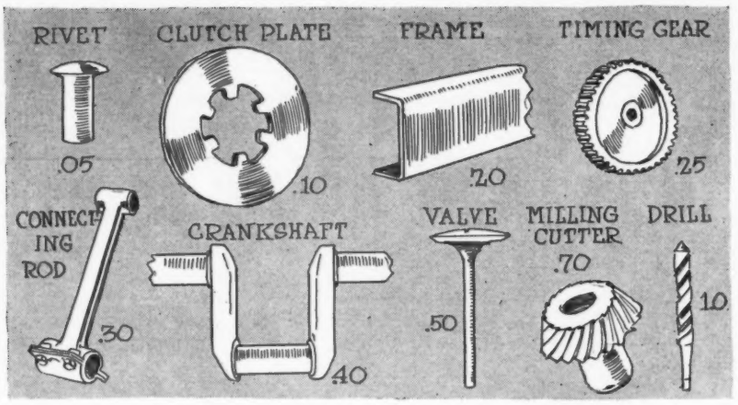
In the laboratory of the metallurgist the microscopic study of the structure of steel brought into concrete form by the use of the micro-photograph which shows the metal magnified, from ten to 1,200 times, exactly parallels the work of the pathological scientist in its far-reaching effect upon the use of materials. The metallurgist's prescription book has to do with the vitality and fitness of the metals used in our big industries in the same way that the prescription book, or the surgeon's knife, has to do with the health, strength and vitality of the human race.

The doctor of medicine knows what elements will build up human tissue, he knows what will purify the blood, what will stimulate and what will deaden the activities of the human organs. The athlete, training for a gruelling contest, knows that certain foods will give him stamina and endurance. The uses of starchy food and sugar develop fat, iron is a blood purifier and so on through the list. People of the far north live on fats such as blubber. It gives them the heat to withstand the intense cold. People at the equator live largely on fruits and other foods which do not product heat.

With steel it is the same. For the steel used in the crankshaft of a motor we need the characteristics of rigidity and the ability to withstand great torsional stress. In the valves we need steel that will withstand the effects of high temper-

Materia Medica

Iron	The basis of steel
Carbon	The determinative
Sulphur	A strength sapper
Phosphorus	The weak link
Oxygen	A strength destroyer
Manganese	A purifying medicine
Nickel	For strength and hardness
Tungsten	Hardener and heat resister
Chromium	For resisting shocks
Vanadium	The fatigue resister
Silicon	Impurity and hardener
Titanium	Removes nitrogen and oxygen
Molybdenum	Hardener and heat resister
Aluminum	Kills or deoxidizes steel



Parts made from steel having different carbon percentages showing, by practical examples, how the increase in carbon gives a decrease in the welding ability of the metal and an increase in its hardness

atures and the constant hammering on the valve seat. For gear wheels we need steel that will endure the continued engagement of tooth upon tooth in the transmission of the heavy loads due to the propulsion of the automobile. Then again we have the steel used for such purposes as the magnets on a magneto. This metal has no stresses to endure but must on the other hand retain the magnetism in order to permit the instrument to generate its current of electricity.

In all metallic ores there are impurities. In the human being certain medicinal treatments neutralize or remove impurities; in metallurgy we have corresponding medicines that destroy the harmful effects of the impurities inherent with a particular metal, these are added, not for the purpose of giving additional strength through their own properties, but to increase its strength and purity by transforming the impurities into compounds that will not harm the metal.

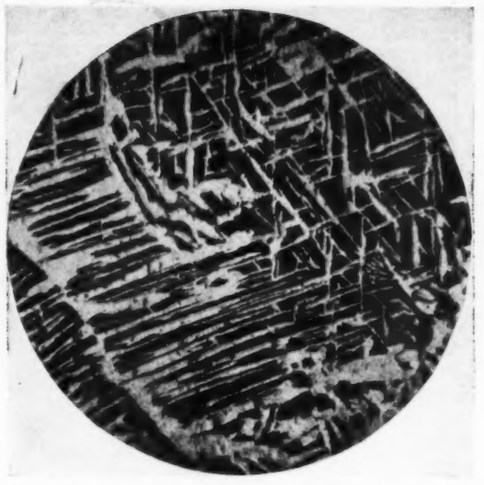
Steel, like all other matter, regardless whether it be in the form of a human being, a tree, a piece of glass, earth or brick, is made up of molecules. A molecule is the smallest possible portion in which any given matter can exist. If we were to subdivide it further we would break it up into the elements of which it is composed. For instance, if we take water and continue to reduce its volume we would finally reach a point beyond which subdivision would be impossible. At that time we would have two particles of hydrogen and one of oxygen. These particles are called atoms. Thus a molecule of water is made up of two atoms of hydrogen and one of oxygen. Hydrogen and oxygen are elements and cannot be further subdivided.

Carbon and Iron Always Present

In a steel we have always the primary elements of carbon and iron. Iron is a metallic element. Carbon is a non-metallic element. The purest form of iron in a natural state is in the best Swedish ore. The purest form of carbon in a natural state is the diamond or graphite. The same matter, which in one form is the valuable diamond in another form is the black graphite. The only difference is that the carbon in the diamond is highly compressed. Carbon is a constituent of all animal and vegetable tissues, of coal and of petroleum. It also enters into the composition of many minerals and in combination with oxygen forms part of the atmosphere we breathe. Combined in certain proportions with hydrogen it forms acetylene gas used for headlights, and with the element silicon in an electric furnace it yields the hardest of abrasive materials.

By varying the carbon content of steel, the metallurgist varies the entire nature of the finished product. The percentage used, as a result, varies widely. As the carbon content of steel increases, the welding power decreases, thus as a general rule ductile and easy-welding steels must be as free from carbon as possible.

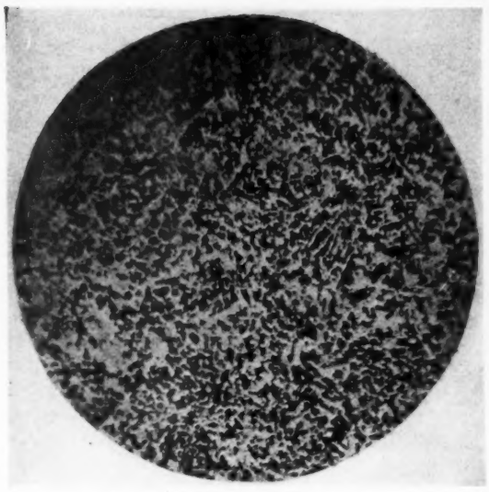
Again, as the carbon content of steel increases, its resistance to shocking stresses decreases. Thus the typical content of carbon for rivets would be .05 per cent. because in rivets a ductile material and one easily hammered into the desired shape is required. On the other hand, the content of carbon runs up to more than 1 per cent. for glass-hard tools,



Microphotograph of steel as it is cast, showing the coarse structure which renders it brittle and unfit for usage in parts undergoing stresses—W. Campbell

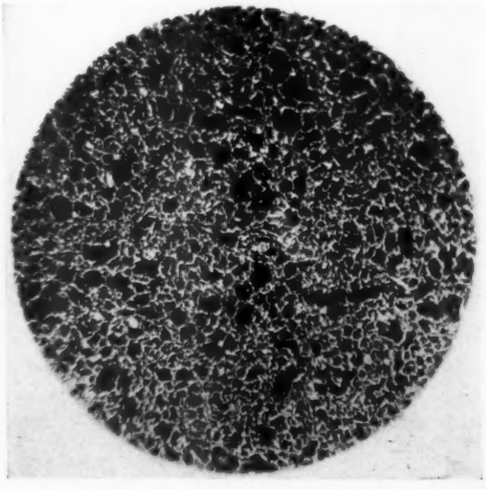
Open hearth steel casting before annealing, showing the metal as originally cast. The dark circles surround globules of manganese sulphide and represent weak spots in the casting—Iron Age

Manganese sulphide in a refined casting. This shows the tree-like formation often taken up by manganese sulphide and represents an area where the strength of the normal grains of iron and carbon combinations are weakened—W. Campbell



Microphotographs of same steel as shown on opposite page after it had been heated to 850 degrees centigrade and thus refined—W. Campbell

Same open-hearth steel casting as that shown on opposite page after annealing. As shown by the dark circles, the manganese sulphide is still present in its characteristic globules—Iron Age



Microphotograph showing the uniform grain of special steels in which strength is a requirement. This is a chrome-nickel steel in which the uniform composition and arrangement of the molecules will be noted—Iron Age

etc. For small drills the amount of carbon will sometimes be as high as 1.5 per cent. The higher the steel is in carbon the harder it becomes and thus we find that in order to present a hard and unyielding surface at points of wear it is very often necessary to carbonize the exterior shell of the metal forming a hard casing about the softer core. This process of carbonizing the exterior is known as case-hardening.

Case Hardening—Metal Callous

The case-hardening of a metal has its parallel in nature in the formation of callous skin on a part which is submitted to wear or abrasion, the difference being that in one case the hardening of the exterior portion submitted to wear is done deliberately, while in the other it is done by a natural process.

Examples where case-hardening is used in automobile work are extremely numerous, but, to give one or two good examples, the cams on an integral camshaft may be mentioned. Here we have a shaft, that, with the exception of the points where the cams bear on the followers, must only meet torsional and bending stresses. On the surface, the cams must meet the constant rubbing and wearing contact. It is evident that at the point where this wear takes place a glass-hard protecting skin over the surface of the metal is desirable and here the use of the case-hardening process finds one of its best uses.

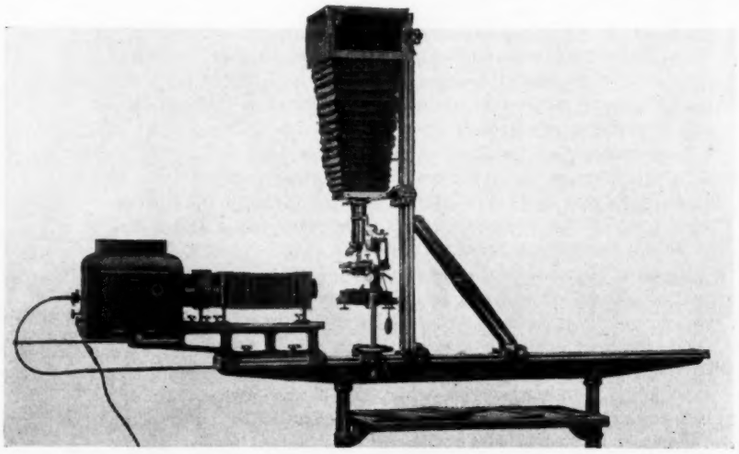
Other examples may be given practically without limit, but, to mention one other, the gear wheel may be cited. Here the tough steel necessary to perform the work of transmitting power is surrounded by a case-hardened shell to take the rubbing wear of tooth upon tooth, thus combining the advantages of the tough steel with that of the hard bearing surface.

We shall return to carbon, but let us leave it for a while to discuss the other elements which we find always present in all steels.

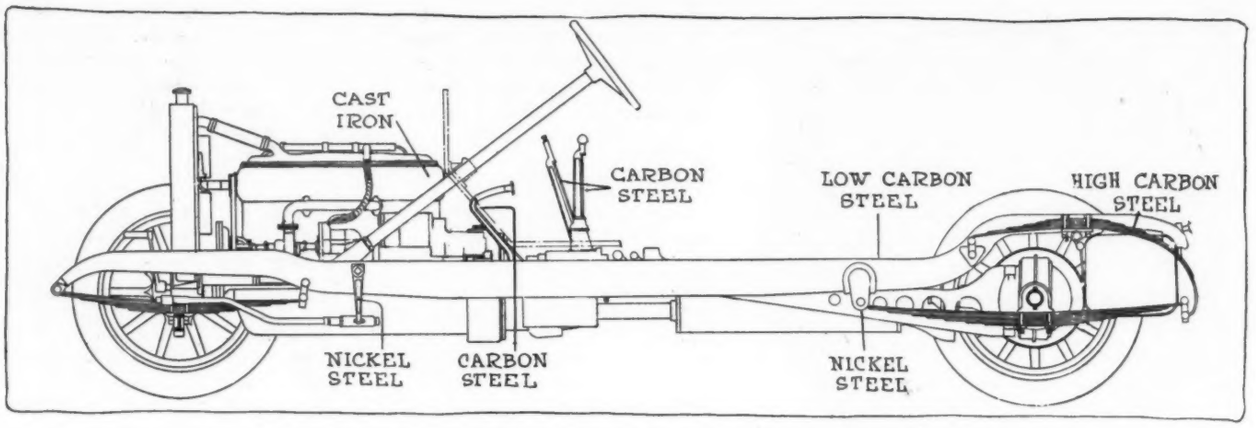
Manganese is one of these. In steel manganese is a medicine. Taken alone it decreases rather than increases the merit of the steel for all ordinary purposes. It reduces the malleability of the metal, but is added intentionally in quantities as high as 1.5 per cent. to palliate the evil effects of the two arch enemies of steel—sulphur and oxygen. What iron or sulphur is to the human blood, manganese is to steel. Therefore, when the doctor of metallurgy writes the prescription of a particular metal he does not neglect the manganese ingredient in order to counteract the poisons, sulphur and oxygen, which he knows will be present because they cannot be entirely separated from the iron in the refinement of the ore.

Sulphur Isolates Molecules

The action of sulphur comes back to the molecular construction which we considered at the beginning. Sulphur has the quality of incasing the molecules of iron and separating them from their neighbors, thus weakening the structure. When manganese is added, the sulphur for which it has a strong affinity combines with it in the form of a sulphide drawing together into minute globules (see page 612), which are practically harmless to the finished structure of the steel. In the refinement



Illustrating the apparatus made by the Bausch and Lomb Optical Works for making microphotographs



Chassis showing some of the different kinds of steels used for specific purposes

CARBON CONTENT IN PER CENT. OF VITAL STEEL PARTS

From Five Representative American Cars

Car	Conn. Rod	Crank Shaft	Valve Stem	Valve Head	Clutch Plate	Tim. Gears	Trans. Gears	Drive Shaft	Chassis Frame
a ...	.30	.40	.50	.50	.14	.30	.20	.30	.30
b ...	.25	.45	.20	Tungs.	.14	.20	—	.35	.25
c ...	.25	.47	Tungs.	Tungs.	.10	.25	.50	.40	.25
d ...	.25	.40	.50	.50	.14	.20	—	.40	.25
e ...	.35	.45	Tungs.	Tungs.	.85	.40	.25	.45	.20
Aver.	.28	.43	.40	.50	.27	.27	.31	.34	.25

of steel the sulphur percentage is rarely allowed to exceed .04, whereas in the pig iron the percentage of sulphur is quite frequently .10.

Oxygen an Impurity

The oxygen found in steel, which acts in the nature of an impurity, is generally in combination with the iron in a rust formation known as iron oxide. If a steel contains a given quantity of carbon, phosphorus and manganese a greater amount of oxygen will give the steel considerably less ductility with greater hardness; in other words it tends to make the steel brittle. When the manganese is added the oxygen combines with it as a manganous oxide which is less harmful to the general structure than the iron oxide. Carbon steel such as is in common use will generally run very close to .65 per cent. manganese.

Phosphorus, another impurity, is always found in steels.

Phosphorus is one of those elements necessary to human life but harmful to steel. It is necessary in members of the animal and vegetable kingdoms because it forms the bone and blood tissues of one and the fibrous foundation of the other. Originally the element was separated by distilling it from the bones of animals. It is a peculiar substance in that it is highly inflammable even in open air in which it blazes forth at a temperature of 34 degrees centigrade. When handled in its pure state it must be kept under water continually. In steel, however, it weakens the structure forming little areas which under the microscope look like small lakes and which in actual results are areas of weakness.

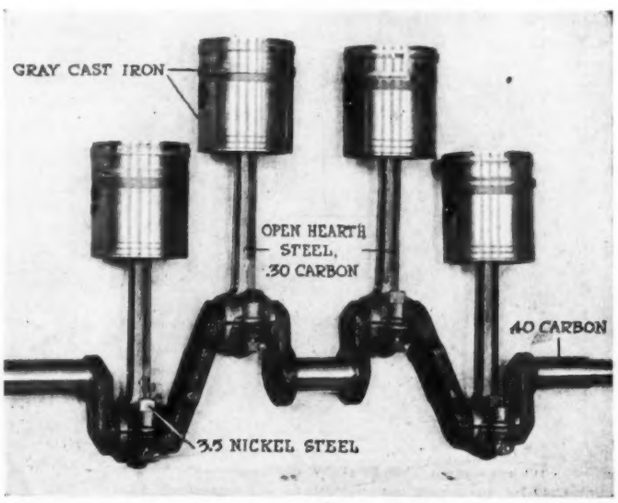
By careful refinement it is generally kept as low as .03 per cent. Instead of using a medicine for the neutralization of this impurity it is kept as low as possible in the refinement. It is removed from the metal, which comes from the blast furnace where the ore has had its primary purifying, by oxidizing, forming a gas which is blown away. In the Bessemer process the oxidizing is accomplished by blowing oxygen or atmospheric air through the molten mass. In the puddling process oxidizing is by stirring the oxygen contained in iron ore into the mass. In the open-hearth process both are done. These three methods are among the elementary distinctions which characterize the processes named. The slag which floats on top of the molten mass is most often a silico-phosphate which has been produced by the addition of iron oxide, lime or other strong base.

Other Impurities

Thus far, we have referred to carbon, manganese, sulphur and phosphorus. These are the elements always present in steel. In addition many traces of other impurities can be found, such as aluminum and silicon and others varying with the nature of the iron ore and the location of the mines.

In a nutshell, carbon is the nerve force of steel. It is a necessary component and the quantity in which it is present determines the nature of the finished material to the widest extent. Manganese is the medicinal agent which reduces the effect of sulphur and oxygen impurities. Sulphur is an impurity which has the poisonous effect of destroying the cohesion of the healthy molecules in the steel formation by surrounding them with a weak film; and phosphorus is also an impurity forming a weak link in the chain of strength.

The other elements to be considered are those which are added to give the steel the stamina it needs for one task, the rigidity for another, the elasticity for another and so on



Crankshaft and piston assembly, showing the use of different metals in different parts

throughout the gamut of requirements for special classes of work.

Exactly parallel is the practice of medicine. The physician finds in the human body certain components which he must work upon. If certain elements are found to excess he must introduce others to neutralize them. Thus as in steel if sulphur is found to excess manganese will help offset the evil influences of what cannot be removed. But he must go a step further. Besides the mere neutralizing of impurities it is necessary to add other elements to produce the requirements for the tasks that are to be met. As pointed out before if a man lives in the cold climates of the far north he must have heat-producing food. If he is indulging in arduous labor, muscle-building ingredients are necessary.

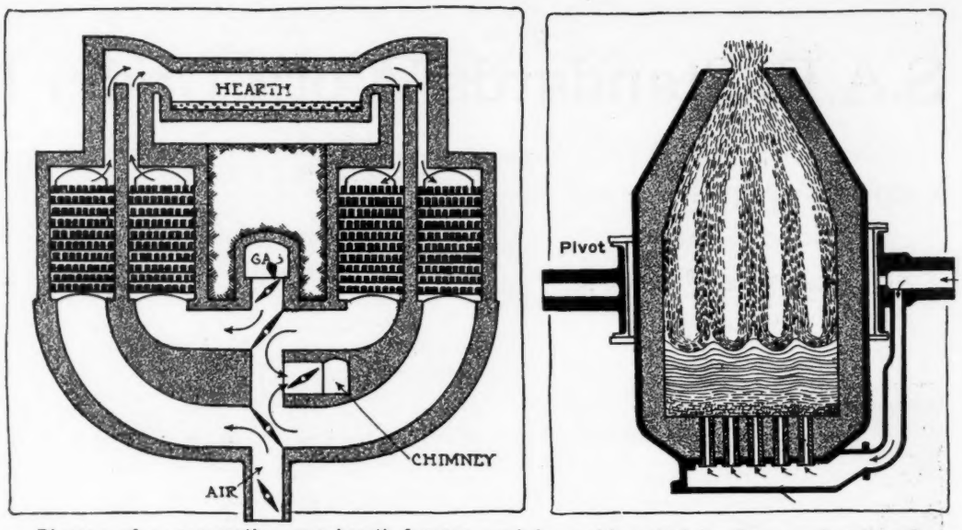
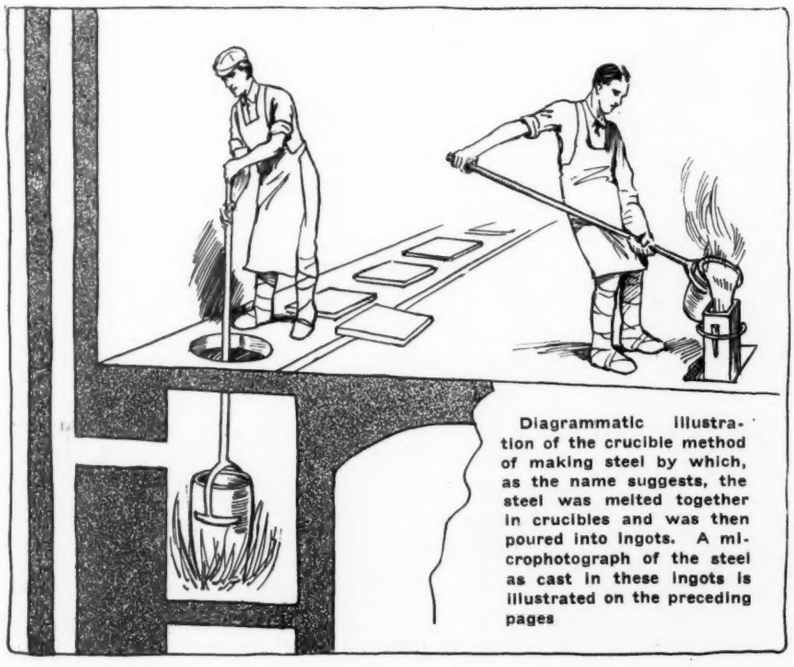


Diagram of a regenerative open-hearth furnace used for making steel by the open-hearth process. This shows the four regenerators, two for the air and two for the gas. The direction of flow of these intermingled gases is reversed every 20 minutes. Right—Diagram of the Bessemer converter for making steel by the Bessemer process. The steel is melted in this and poured by tilting the converter

In steel work there are a great number of alloys covering a wide field of usefulness and which when used in the proper proportions and then submitted to the correct heat treatment will make the steel adapted exactly for the work for which it is going to be employed. It is evident that a stronger steel is needed for a gear wheel than for a gearshift lever, yet both are forgings and both may come from the same original source as regards the raw stock from which the two are made.

The entire art, however, can be brought down to the basis of certain definite qualities which must be created in the metal to give it the primary adaptation to the specific purpose to which it is to be put. These primary qualities may be classed as hardness, toughness, malleability, shock resisting and heat-resisting. These five qualities which a metal may have either singly or in combination, will meet the needs of all the material which are used for structural purposes. There are other secondary requirements which are used in specifying steel for purposes other than construction, such as, for example, retentivity of magnetism, small co-efficient of expansion, small co-efficient of friction, etc., but these qualities are not necessary in the metals which perform duties under the general head of structural work except under rare circumstances.

There are certain classes of steel which perform great labors as parts of heavy tools which would be absolutely unfit for use in the structural parts of an automobile where they must be worked and fitted to conform to the shape of parts to which they are attached. A typical example of this is in steels used for such purposes as rock-crushing machinery which are so hard that it is practically impossible to make any impression upon them with ordinary tools. A piece of steel of this kind could not possibly be used to form a rolled channel section for an automobile side member where malleability and easy-working qualities are desired. Nor could it be readily forged into the shape of a connecting-rod. For these structural purposes it is absolutely unfit and yet for the purpose for which it is used it is practically ideal. The study of the alloys and their use in special fields is of absorbing interest even for one who does not go into it deep enough to actually be able to perform the operation of mixing the metals, but who is only interested from the viewpoint of knowing what it means when one says a steel contains a definite alloy in given proportion.



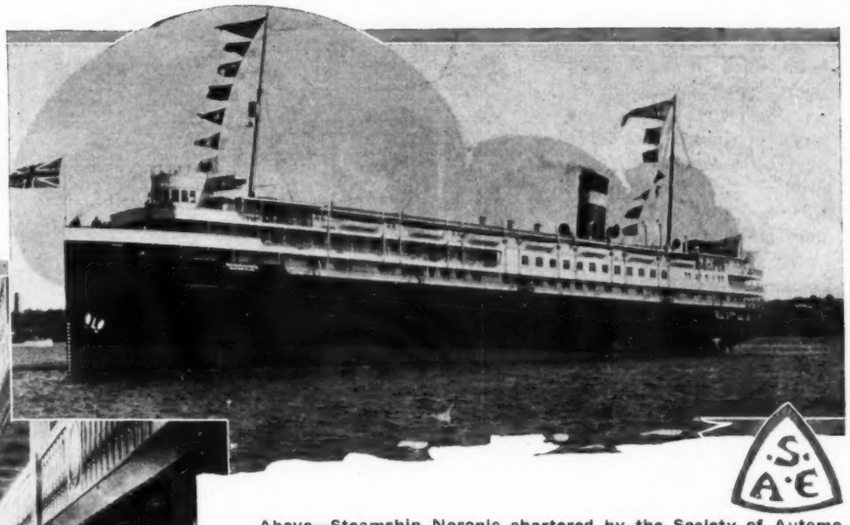
Diagrammatic illustration of the crucible method of making steel by which, as the name suggests, the steel was melted together in crucibles and was then poured into ingots. A microphotograph of the steel as cast in these ingots is illustrated on the preceding pages

Thus we have first the foundation consisting of iron, carbon, various impurities such as phosphorus, sulphur, etc., and manganese in every steel. After this are added the alloys to make it fit for special work, next the heat treatment for the specific work must be accorded and finally the proper material must be selected to do the work on the particular part in which it is used. The most expensive materials may not always be the best. It is a matter of selecting the proper specifications.

(*To be continued*)

S.A.E. Standards Work Under New Rules

Summer Trip Itinerary Decided Upon— Two Steamers Required for Trip



Above—Steamship Noronic chartered by the Society of Automobile Engineers for the summer session in the waters of Georgian Bay

Left—The spacious interior of the steamship Noronic provides ample accommodations for the engineers and their families

NEW YORK CITY, April 3—The Standards Committee of the Society of Automobile Engineers will hold its spring meeting at the Detroit headquarters of the society in the Boyer building. The meeting of the committee as a whole will open at 10 o'clock April 22, but on the same day and for several days previous there will be meetings of the various divisions for the purpose of bringing matters up to date before presenting them in the form of reports to the Standards Committee.

The purpose of the meeting, which will continue throughout the day, is to hear interim reports from the divisions and the sub-committees and to take up any new business or new work that should be whipped into shape for the coming meeting of the society in June. Meetings of the Springs Division and the Miscellaneous Division have been held during March with a view towards having definite reports to submit to the committee meeting and reports are also expected from the Carbureter Fittings, Electric Vehicle, Iron and Steel and Research Divisions.

The meeting will be the first to be held under the new regulations which have been drawn up and approved by the Council of the society. The aim is to formally bring these meetings down to a standard basis and by this means to keep a definite record of the progress of the work of each division of the committee. The matters under advisement by the different divisions will now be under the direct supervision of the chairman of the entire committee. Chairman Zimmerscied will be assisted in this work by A. C. Woodbury, who will act in the capacity of recorder.

It is expected that the various divisions will have progress reports to make on a great number of various subjects, among which may be mentioned the folowing:

Curves and tables of physical properties of S. A. E. alloy steels. Uniform license pads and mounting of same. Speedometer drive shaft ends. Exhaust manifold outlet for hot air carbureter connection. Dimensions of piston ring grooves. Distance between the cylinder boss and center of side outlet carbureters. Speed and mileage ratings for electric vehicles. Motor voltage of electric vehicles. Efficiency test of solid tires. Number of cells in standard battery vehicle equipment. Flat fan belt widths. Rubber hose and hose clamps for cooling systems. Cotter pin sizes. Nomenclature of cantilever springs. Test of parallelism of eyes and master leaf or

S. A. E. Summer Meeting

Detroit-Georgian Bay and Return

June 14-17

SCHEDULE

Leave Detroit, Monday, June 14, 2:00 p. m., Central Time, *S. S. Noronic.*

Arrive Midland, Tuesday, June 15, 2:00 p. m., Eastern Time, *S. S. Noronic.*

Leave Midland, Tuesday, June 15, 2:15 p. m., Eastern Time, *S. S. Waubic.*

Arrive Parry Sound, Tuesday, June 15, 6:00 p. m., Eastern Time, *S. S. Waubic.*

Leave Parry Sound, Wednesday, June 16, 9:00 a. m., Eastern Time, *S. S. Waubic.*

Arrive Point au Baril, Wednesday, June 16, noon, Eastern Time, *S. S. Waubic.*

Leave Point au Baril, Wednesday, June 16, 3:00 p. m., Eastern Time, *S. S. Waubic.*

Arrive Parry Sound, Wednesday, June 16, 6:00 p. m., Eastern Time, *S. S. Waubic.*

Leave Parry Sound, Wednesday, June 16, 6:15 p. m., Eastern Time, *S. S. Noronic.*

Arrive Detroit, Thursday, June 17, 5:00 p. m., Central Time, *S. S. Noronic.*

Members going East can leave Detroit at 6:10 p. m.

leaf springs. Modification of eye and bolt tolerance for leaf springs. Frame brackets for leaf springs. Offset of center bolts of leaf springs. Nuts for spring clips of leaf springs. Modification of center bolts standard for leaf springs. Width of springs for pleasure and commercial cars. Center bolt nuts of leaf springs. Length, opening, etc., of spring clips of leaf springs. Spacing of clips. Pressure blocks. Length of spring seat. Material between spring and spring seat. Concavity of leaf spring material. Standard inspection methods of physical tests of leaf springs Standard tolerances as to height and load of completed springs.

The new regulations are digested herewith.

I. Origin and Functions

1. Standards Committee to have jurisdiction over all standards and recommended practices, also to make special investigations in the discretion of the counsel.

II. Organization

2. Standards Committee shall act under a chairman assisted by a recorder.
3. Whole committee to be subdivided into divisions and sub-divisions presided over by chairman.

III. Appointments

4. Appointments made annually by the council in conference with chairman of the Standards Committee, who is appointed annually by president of the Society.
5. The President and Secretary of the Society ex-officio members of Standards Committee and divisions.

IV. Procedure

6. Standards to originate in division covering properly that phase of work. Reports must be favored by a majority of voters of a quorum which consists of more than half a division.
7. No final action to be taken except at meeting called for that purpose.
8. Reports to consist of concise statements afterwards explained if necessary.
9. Division reports to be approved by Standards Committee, fifteen members of which comprise a quorum. Reports then forwarded to council for its approval.
10. After council approval reports are submitted to the Society for acceptance.
11. Reports may be passed on by letter ballots, a majority of ballots deciding the adoption.

V. Meetings

12. Standards Committee meetings day preceding or day of Society meeting and on second Thursday in April and October each year.
13. Division meetings on days of or preceding Committee Meetings. Special meetings on approval of Standards Committee chairman and Society secretary.
14. Division chairman to notify committee chairman regarding details of meeting.

VI. Committee Records

15. Recorder to keep full attendance records.
16. Division chairman to file progress reports at each Standards Committee meeting.
17. All correspondence to be filed with secretary of Society.

VII. Miscellaneous

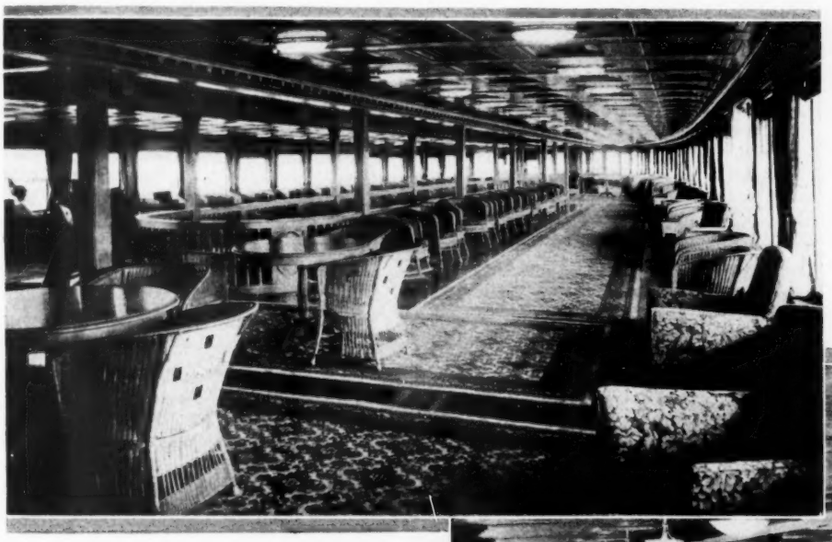
18. Publicity must pass through regular Society channels.
19. Official stationery to be furnished by secretary of Society.
20. No obligations for expenditures other than postage are assumed by the Society except by authority of the council.

Summer Itinerary Announced

The full itinerary of the summer trip has been finally announced. The trip will include a voyage through the far-famed Thirty Thousand Islands where it is necessary to use a smaller steamer.

The Noronic will dock frequently at some of the interesting points, allowing plenty of time for shore visits and entertainment. It is expected that, in view of the success of the past summer meetings, a large number of ladies will participate in the trip. Chairman Lloyd of the Meetings Committee promises a technical program of value and the Standards Committee has several reports to submit which are also of great importance. The business and professional sessions will be held in the mornings and evenings, allowing the members to have the afternoon free for consultations and entertainment. The Standards Committee meeting will be held Monday afternoon and the first business and professional session on Monday evening. Others will be held Tuesday morning and evening, Wednesday evening and Thursday morning.

The fare for the complete trip on the Noronic and Waubic is $26 per person with berth and meals included.



An ideal space is provided on the steamship for the holding of the business and professional sessions. The arrangement of the program gives practically every afternoon for recreation, the business being carried on in the mornings and evenings

There should be no congestion in the dining hall of the Noronic. Note the broad aisles and large tables illumined by a modern system of indirect lighting. Excellent service and food is a part of the S. A. E. program

Overhead Valves in Theory and Practice

Difficulties of Valve-in-Head Design and Manufacture—Why Overhead Valves Are Unpopular

By A. Ludlow Clayden

THEORETICALLY the combustion space in an internal combustion engine should be spherical, because a sphere has more volume in proportion to surface than any other body. Since the energy of the gas burnt in a motor is derived from heat it is desirable to prevent any cooling of the gas till its work is done. It is necessary to cool the cylinder and piston so the less hot gas in contact with the comparatively cold walls surrounding it (comparative with the total volume of gas) the better the thermal efficiency of the motor.

Like many theories, however, it is not capable of being put into practice; even if the combustion space was spherical, it would cease to be so as soon as the piston started its downward travel, but by using overhead valves, or sleeve valves like the Knight, or disk valves, or any sort of valve that does not need a side pocket to work in, we can approximate to the spherical shape and obtain a better construction from the point of view of thermal efficiency, than can possibly be had with the ordinary kind of engine.

Also with the valves set in the cylinder head the gas flows directly into the middle of the combustion space, and it can escape as exhaust without having first to crowd its way through a narrow pocket space; there is a more free flow both in and out. These are all small matters dealing with fractions of heat units and fractions of volumetric efficiency, but we all know that the remarkably high general efficiency of the automobile is made up from consideration of infinite infinitesimals.

In heat theory the overhead valve or the sleeve valve has things all its own way, but when practice is taken into account we find that there are things which offset theory so that it is not easy to take advantage of theoretical qualities, even when money is no object. When it is—and that expresses the average case—then the valve-in-head motor cannot put up much of a fight since the pocket type of engine is unquestionably cheaper.

Valve Operation Difficult

Probably the chief trouble that faces the designer of an overhead valve motor is to devise a method for operating the valves that will meet all requirements. There are three main systems in use, that in which the camshaft is in the ordinary location and long push rods lead up to rockers on the top of the cylinder block, that in which there is one overhead camshaft operating the valves by rockers and that in which there are two overhead camshafts operating the valves directly, or through very short, straight push rods. Compare any of these with the pocket style of valve layout, and it is obvious that there are more parts and consequently more expense is involved. Leaving cost on one side for a moment, we may consider the points in favor of and against each of the three systems enumerated, the last first, since it is the newest and has been claimed to be the best of all from the efficiency standpoint.

When the Peugeot company began to build racing cars seriously and to make a very big bid for the position they have succeeded in attaining, their engineers looked to the overhead valve to give them the maximum power for the displacement volume of the motor.

Operation by Two Camshafts

First they discarded the idea of using the usual location for the camshaft and long push rods because of the considerable weight of metal which this construction necessitates in the linkage between the cams and the valves themselves. The scheme that appealed to the Peugeot engineers was a single overhead camshaft with either a worm gear or a bevel drive through a vertical shaft. Accordingly, this was tried out, but severe trouble set in with the gears used for driving the shaft, both worms and bevels being unable to stand up to the stress imposed upon them. The writer has seen worm gears of fair size taken from one of these experimental engines with the teeth actually bent over in a hook shape, so hot had they become in running. The explanation for this was not obvious but it was thought to be somewhat as follows: in this explanation it must be remembered that it is only a suggestion and very likely not true.

Camshaft Drive Difficulties

It is a fact that the cylinders expand when heated and so it is also a fact that the camshaft and crankshaft get further apart as the motor warms up. Other facts are that both worm gears and bevel gears create a thrust, and with small gears such as are used for camshaft driving the thrust is quite heavy. If bearings are arranged to support a bevel or worm gear at each end of a vertical shaft and adjusted properly when the engine is cold they will not be correct when it is hot and *vice versa*. This means that even if we adjust the bearings when the cylinders are hot, we cannot be sure that the meshing of the gears is correct at any time. If it is incorrect then the gear will heat up. This seems to the writer an inadequate theory, but it was the explanation given for the adoption of a train of driving gears of spur type arranged one above the other all up the front of the motor.

Abandonment of Rockers

The next Peugeot development was the abandonment of the rocker construction with the single overhead camshaft, because trouble was experienced with the rockers themselves and with their bearings, while when it was decided to use four valves per cylinder, there was not too much room for the rockers and their fulcrum shaft. Using two camshafts to operate the sixteen valves enabled the push rods between cam and valve stem to be made very small and light so that the reciprocating mass for each valve was a minimum, and this assists accurate valve working at very high engine speeds. It may be added that the object in using four valves was to obtain the desired area of opening with the minimum valve weight, and that every automobile engineer agrees that the four-valve construction is the best for very high-powered engines.

Lessons of Racing

At the conclusion of the 1913 racing season in Europe, when Peugeot and Delage with very similar motors had swept the board, it was commonly thought among French and British engineers that the Peugeot construction was really an advance on any other. So great had been the Peugeot success that their competitors were ready to accept the explanation for the peculiar construction given above. But there were some who held to the courage of their own convictions and among these were

the designers of the Mercedes. It would be difficult to imagine two engines more different than the Peugeot and the Mercedes used in the Grand Prix race in France last July; the former followed the previous year's design almost exactly, but the latter was an adapted aeronautical motor. Instead of cast iron cylinders in a block, it had pairs of cylinders all steel, made up from a combination of forgings and pressings welded together. It had four valves certainly, but they were not operated by two camshafts. On the contrary there was a rocker shaft, a fairly small bevel driven vertical shaft, and all the features of design which the Peugeot men had discarded. Neither Peugeot nor Mercedes had any valve trouble but the latter were slightly the faster car and their engines turned over more rapidly. Allowing for differences in tire size, the relative engine speeds at 100 miles per hour were 3,123 for the Mercedes and 2,620 for the Peugeot. These speeds do not, of course, represent the maximum revolutions attained on the lower gears when hill climbing, while both cars did much more than 100 miles an hour on the straights. The fact that the average engine speed of the Mercedes was higher than that of the Peugeot shows that it *is* possible to use rockers and a bevel driven overhead camshaft, but just why this succeeded on the German car and not on the French is difficult to guess. The obvious difference between the motors was in the cylinders and it has been suggested that while a block cast, iron cylinder must expand unequally the steel cylinders of the Mercedes being machined all over inside and out, could be relied upon to expand with complete regularity. This would perhaps, mean less stress on the valve mechanism. It seems more likely, however, that the Germans had discovered the best material for the bevels they used and that the Frenchmen had not done so.

With Normal Camshaft Location

If we except the Fiat design, the most popular form of overhead valve operation is certainly the long push rod with the camshaft situated in the crankcase as usual. This has been used very widely in Europe by all nationalities and many thousands of cars with this style of motor are produced each year in this country. Probably the output of the two leading American makers alone is almost equal to that of the rest of the world; if some of the very small motors are excluded it certainly is. Yet we find that the users of overhead valves here have had comparatively few imitators. Lately there has been renewed interest in this kind of motor, and this has undoubtedly received a stimulus from the supremacy of the overhead valve in European racing engines, but any who are considering a change over from the ordinary pattern would do well to think it over carefully.

First, the machining of a motor with overhead valves is more expensive. On the cylinder block there are the spaces to bore for the cages, there are the cages themselves to be made, there are the rockers to make, there is the rocker shaft and the mounting for it. Also we find that the encasement of the overhead mechanism calls for fresh parts. All this is *additional* to the requirements of the pocket type engine, for the camshaft is no cheaper and the lower end of the push rod system has to be almost exactly like that required for the operation of ordinary valves. Makers who have laid down plans for turning out this type can no doubt do it cheaply enough, it might not save them much to change over to the pocket motor, but people equipped for the standard form would certainly have to face increased expenditure.

Speed of Racing Motors

Next, racing experience—which is the ultimate test—has shown that extremely high power can be got from the cheaper form. It must be remembered that the immense power of racing engines is obtained from high speed of revolution. In the Grand Prix in France last year the drivers changed to a lower gear if the motor speed fell below 2,000, and did not change up till it was between 3,000 and 4,000 on a lower gear. At such speeds the free gas way given by the overhead valves and the better thermal efficiency of the system can tell, but motors of this sort are not needed for every-day automobiles. Quietness is much more important, and it is not easy to get with the long push rod scheme as we have the trouble of difference in the rate of expansion of the cast-iron cylinders which get fairly hot and the steel rod which keeps fairly cold. Perhaps it would be more correct to say that quietness with this type of motor is more difficult to maintain, rather than to obtain, since with care it is possible to adjust the clearances so as to give excellent results.

Again, as was pointed out in describing the Peugeot experiments, the push rod system is not the best to use when one wants very high motor power—at least in the opinion of many engineers who have tried it—so if we want the full benefit from the overhead valve we must go straight to the overhead camshaft, and it needs no elaboration of argument to show how expensive that is.

Accessibility

The outstanding advantage of the long push rod pattern of motor is that its valves are more accessible than those of any other kind of motor. It is easy to release the rocker, easy to extract the valve complete with its seating and so it is easy to keep the valves well ground in, and in an efficient condition. Often it is possible to scrape the carbon from the head of a motor of this kind without removing the cylinders, as sufficient room is given when the valve cages are out. These, rather than increased power, are the advantages of overhead valves as viewed by the average automobile owner.

In these days of freedom from valve trouble accessibility is not so important as it used to be so its provision is not worth a very heavy increase of cost in motor construction.

Lubrication Troubles

Another difficulty with overhead constructions is to arrange matters so that the rockers obtain efficient lubrication while protecting the valve stems and cages. It is important that there should be no leakage of oil into the valves themselves, as such will cause heavy carbon deposit in a place where it is especially troublesome. It is also equally important to properly lubricate the rockers, because otherwise noise troubles will be aggravated greatly. This is a difficulty that can be overcome, and it is only mentioned as showing that yet one more thing has to be thought of when laying out an overhead mechanism.

When we come to a revision of design forced by other circumstances there is more reason to consider overhead construction, and the present state of development of the eight-cylinder motor seems a great opportunity for obtaining the thermal efficiency advantage and the advantage of very much greater accessibility without a big increase of cost. With the eight most manufacturers are in the position of creating a new design altogether, they do not even use cylinders that will fit another motor. This cuts down the cost of using a new valve scheme enormously.

Also the eight is difficult to construct so that the valve push rod adjustment is really easy to get at, and with the smaller cylinders of the eight it is particularly important that the push rods are kept in proper condition; too much clearance may easily have a serious effect upon the power. Between the cylinder blocks seems to be the ideal place for the carbureter the ignition and even perhaps the generator and starting motor, so there is something to be gained on their account if the valves can be got away to another situation. It looks as though there were splendid opportunities to devise new schemes, even to arrange the crankcase as a permanent bed plate in the frame. It would be out of place to go into detail here, but the writer wishes to call attention to the fact that the automobile engineer whose designing ingenuity has for years past been held in check is now offered a chance to exercise his faculties freely.

Spring Brings Unprecedented Flood of Car Orders to Detroit Factories

Increasing Sales All Over the Country Reflect Improved Business Conditions—Eights, Sixes and Fours All Selling at Record-Breaking Rate—Plants Stepping Up Production—Some Working Night and Day

By L. V. Spencer

DETROIT, MICH., April 6—The sun is shining in Detroit on the automobile industry. The prediction for April is that orders will exceed the business of the same month a year ago, and then, too, practically every manufacturer expects April to be overshadowed by May and June—an outlook which was not entertained so strongly at this time last year.

Car Sales Reflect Improved Condition

To a keen analyst, the reasons for a startling picking up in the automobile business at this time are plain, and are but the logical outcome of conditions. People were hoarding money last fall when business conditions were uncertain, but now that general confidence is restored, they are letting go, and buying cars, many of them having planned to do so before, but hesitating until they were sure they wanted to spend the money.

Another reason for the rush, which has come within a few weeks, is that we have generally experienced a better spring than last year, the weather being brighter in most sections of the country, and this letting the roads get harder earlier. Several factories can cite direct results of this. They say that the dealers and salesmen are turning the cars over to buyers almost as soon as they arrive, in marked contrast to last year when the vehicles sometimes accumulated before they could be disposed of.

Several manufacturers who have big fields for their cars in such states as Kansas and Missouri say that these communities have not opened up as yet. These states have been under snow up to the present, but a few warm days are expected to open them up for a big trade.

Unexpected Production Activity

Asked as to production conditions, not every factory in Detroit will talk for publication, some being of an ultra-conservative turn of mind. But when assured that their data will not be published, they tell of striking activity, which they confess was not expected this year.

Eight-Cylinders Sell Well

The eight-cylinder contingent is very busy, and their outputs are meeting expectations. Cadillac, the pioneer, has marketed to date 6,100 of its eight-cylinder cars, more than 100 of them being in their home city. Before the close of the month, Cadillac expects to have stepped its production up to 125 cars a day. It is running considerably over the hundred mark. One day last week, the output was 117, to be specific. As an indication of the gait to which the Cadillac factories are operating now, the working force is about 8,100 men, as compared with a maximum of 7,000 to 7,500, which was the most it ever employed in the rosiest days of its four-cylinder cars.

The King company, second to come out with an eight, reports that the greater part of its average daily output of forty-five cars is of the eight-cylinder type. The ratio is about three fours in every ten cars shipped. On this basis, the February production was 280 cars; that of March was close to 400 cars. Quantity orders are reported; the English government the week before last was shipped thirty-eight eight-cylinder cars, these going to London to be distributed for war purposes. As late as last week, sixteen King eights went to Russia in one order.

While Claude S. Briggs, head of the Briggs-Detroiter company, another builder of eights, would give no figures as to production at this time, nevertheless he says that his company has, for the last 6 weeks, been working night and day, with Sundays no exception. The eight is pushing the four in his estimation, and business is about half of each type of car, although he predicts that before long the proportion will be 74 per cent. eights and 25 per cent. fours.

4,500 Orders on Hand

Naturally, much interest attaches to the doings of the Scripps-Booth Co., whose design of car and its lightness along with the best of appointments are somewhat of a new thing to automobiling. There can be no doubt that it is taking, for its shipments are now better than ten cars a day, with indications that production will get up to 100 cars a week in another week. It is purely a matter of production with this company as over 4,500 orders are actually on hand with some 500 of them for immediate shipment.

Orders Come by Wire

The Saxon Motor Co. is going to be successful with its six at $785, and President Harry Ford says that the concern is now turning out seventy-five cars a day, fifty of which are of the small four-cylinder design, and the balance the new six. This is rapid going on such a new car, as the first of them did not get out until several weeks ago. All told, the Saxon company received 2,059 orders for its cars—fours and sixes—during March. Since the first of this year, the enlarged Saxon plant has built and shipped some 3,000 cars. President Ford read us a telegram that will serve to show how things are moving. The Northwestern Automobile Co., Minneapolis, wired that the six demonstrator had arrived and wanted to know if it could have 1,000 of them during the next 3 months.

22 Per Cent. Ahead of Last Year

The Hupp Motor Car Co. is also in on the good work. March this year was 22 per cent. ahead of the same month a year ago. Just now the Hupp plant is working for a production of eighty cars a day—this has not quite been reached yet, but that will be the average day's output before the end of this week. It is about seventy-five a day now, and has been since the latter part of March. It is no small matter

for a concern to step its production up even five cars a day.

In most motor departments Hupp is working a night shift to keep up. In March, there were 327 more immediate shipment cars than the plant could get out—that were carried over into April, but by Saturday, April 3, 320 of these had been filled. But on April 3, at the close of business, the books showed 594 immediate shipment orders to be filled—April business. Here are some figures showing orders received on the dates given: March 30, eighty-six; March 31, forty-five; April 1, 392; April 2, 161; April 3, fifty-eight. All of these were not for immediate shipment.

Paige is also in the van. The production here for January, February and March is about 700 cars ahead of the same period a year ago, this despite the fact that due to the cars being of higher price—the new six replacing the former lower-priced four now discontinued—the value of product was greater. Last year the April production was 1,400 cars, and J. F. Bourquin, general manager, states that the same output will be adhered to this April. He says further that it looks as if it will hold up for May and June also; that last year a dropping off was foreseen for the months following April, but this season such is not indicated. The Paige Company is turning out from forty-five to fifty cars a day, and there are about three sixes to every two fours.

5,000 Orders for Small Fours

The Regal company, also an eight-cylinder adherent, has not as yet commenced production on this type, its plant working on four-cylinder business, according to Fred Haines, president. This week the production is twenty cars a day, but he confidently expects to get this in shape for a fifty car-a-day output in the course of 2 weeks. This is on the basis of two-thirds small fours and one-third the larger four. There are over 5,000 orders on Regal's books for the small fours for immediate shipment, President Haines says, proving that the demand for this type is still very strong despite the eight.

Regal eights will begin to come through about April 15, and between that time and August 1, the concern expects to build 1,000 of them on a ten-a-day schedule. As an indication of how Regal is moving, some 1,600 letters were received today on car selling matters.

To Double Daily Production

Dodge Bros. are doing considerably better than 100 cars a day now. The intention is to put the production up to 200 cars a day and preparations are under way. One day not long ago, 139 were built, and this varies somewhat from day to day. There are now about 7,500 men on the Dodge pay-roll, as compared with about half this number in the days when Dodge Bros. were not car builders.

These statistical reports are not for every plant, as will be seen. Several of the big ones such as Maxwell, Packard, Studebaker, Chalmers and Hudson did not care to talk.

However, Maxwell, for instance, is doing big things. One day last week, the production was 429 cars, and the average is not far below that number. Studebaker is enjoying excellent business, as is Chalmers which is now engaged in its biggest shipments of the year. Likewise, Hudson is practically sold out, and Packard is "saying nothing, but sawing wood."

Just for variety, Ford has been forgotten for the moment. There is little use comparing its output with that of any other factory, because there is no plant in the world that can show up to advantage when we start out by saying what Ford is doing. The mammoth plant had the biggest month in its history during March. The production was 43,829 cars. March has 27 working days, so the average per day was 1,623 cars. It looks as though the Ford buyers will get the rebate promised if production reached 300,000 cars by August 1.

Statistics Sell Cars to Central Illinois Farmers

BLOOMINGTON, ILL., April 5—Illinois farmers are in a receptive mood when called upon by automobile salesmen this spring. Men who sell cars are agreed that never before in their experience, has it been so easy to interest the agriculturists, as this year. Here in Bloomington, which expects to win the record for the largest distribution of cars of any city in Illinois, outside of Chicago, the salesmen are taking grain quotations in one hand and a catalogue in another. They are pointing out to the farmers that it requires but 747 bushels of wheat to buy a $1,100 automobile this spring whereas a year ago, it required 1,155 bushels. They are also showing the farmers that this spring, it will require but 1,920 bushels of oats to secure a car while a year ago, 2,685 bushels were necessary. Then the prospect is informed that Bradstreet's report showed that in a recent week, 7,358,220 bushels of wheat were exported from the United States, while in the corresponding week a year ago, the figures were only 2,947,966. During the same week, this country exported 16,713,424 bushels of corn, while in the same week a year ago the exportations were but 1,963,352. These arguments are proving effective and can be utilized by any salesman in Illinois.

In the Central Illinois territory, 90 per cent. of the cars sold this spring are going into the hands of active or retired farmers. The men who till the soil, appear to be in a position to indulge in cars and most of them are not backward about doing so. It is pointed out without possibility of contradiction, that every farmer in central Illinois, owning a 100-acre tract and farming it with reasonable success, can afford to own a car when the price of grain is taken into consideration. Financial experts are confident that the farmers will be prosperous for the next few years at least. Even after the conclusion of hostilities in Europe, it will require a long time before the farms abroad can be restored, horses and implements replaced, and agriculture restored to the same footing as prior to the war. This means that the neutral countries must furnish the supply of grain temporarily at least and the United States promises to be in a position to supply the bulk of the demand.

$1,000 Is Maximum Price

While the rush is on for cars in central Illinois, all dealers are actively engaged in attracting patrons. It is apparent, however, that $1,000 is the maximum price that will be paid in this territory. The city buyers are friendly to the higher-priced cars but to the average farmer they are tabooed. The Ford, Maxwell, Dodge, Overland, Reo, Oakland and Studebaker, are the popular cars in central Illinois, and some of these lines are already reporting a shortage.

Truck Progress Slow

While, perhaps, ahead of the game in the number of passenger cars in service, central Illinois has been somewhat backward about investing in trucks. Progress has been slow, due largely to the road conditions and the knowledge that during a large proportion of the year, the highways are not passable to motor vehicles when loaded. In the smaller towns, without pavements, the motor wagons are an unknown quantity and probably will be for many years to come. Bloomington is gradually growing into the use of motor trucks and the leading bus line companies have displaced horses with motor baggage wagons and taxicabs.

Farm conditions in Illinois this spring, are ideal for the first time in many years. All of this means prosperity for the men who sell automobiles and they will reap alongside of the farmers in the harvest next fall.

Dairy Wealth Will Buy 20,000 Cars in Wisconsin for 1915

13,500 Farmers Out of 180,000 Own Cars—Great Market Just Opening—18,500 Cars Sold in the State for 1914—Money Plentiful and Conditions Improving

By Leonard E. Meyer

MILWAUKEE, WIS., April 3—The milch cow is responsible for the great wealth of the Badger State. It has given Wisconsin first rank among the commonwealths of America as a dairy state. It has made it possible for 13,500 farmers in Wisconsin to own automobiles. It will make possible in 1915 a sale in rural districts of not less than 5,000 cars out of the total of 20,000 machines which Wisconsin dealers expect to distribute in this state this year.

180,000 Prosperous Farmers

Because of their prosperous dairy business Wisconsin farmers, who number 180,000, will this year be one of the most prolific sources of business for the builder of motor vehicles. In the final reckoning by the factories and their dealers, the position of Wisconsin as the richest and most productive dairying state in the Union makes a conspicuous factor. To one who has studied the situation at first hand and with a raft of statistics at hand, it appears that the dealers do not reckon sufficiently high when they enumerate Wisconsin's rural absorption of 1915 cars at 5,000. Results may bear out an estimate of 7,500 or even 10,000.

As well-posted men see the situation, Wisconsin will take not less than 20,000 cars in 1915, and approximately one-half of these will go on the farm because the city man's resources at this period do not begin to compare with the resources of the farmers of Wisconsin, due to the splendid crops of 1914 and the enormous dividend which the dairy industry has paid.

Wisconsin Registrations and Fees for 3 Years

Vehicle	Fee	1912	1913	1914
Automobiles	$5	24,578	34,646	53,180
Motorcycles	$2	4,060	6,120	7,880
Dealers	$10	1,052	1,393	1,202
Total revenue		$141,530	$199,400	$293,680

Wisconsin's Wealth—1911 Tax Statistics

Total tax levy	$32,610,975
Assessed valuation	4,718,108,684

Livestock Statistics for Wisconsin

Animals	Number	Value
Horses	678,000	$92,355,000
Mules	3,000	381,000
Milch cows	1,626,000	96,747,000
Other cattle	1,216,000	33,683,000
Sheep	781,000	3,905,000
Swine	2,255,000	27,060,000
		$254,131,000

Just Beginning to Buy Cars

Wisconsin farmers have hardly begun to buy motor cars. Alex J. Cobban of the secretary of state's office figures that 13,500 of the 53,180 cars registered in Wisconsin by private owners in 1914 belonged to farmers. He estimates that in 1913, about 6,750 of the 34,646 cars registered were on the farms. He says the comparatively richer state of the farmer as against the city dweller at this time means that the 100 per cent. increase in rural registrations will be exceeded, and that 7,000 to 8,000 cars owned by farmers can be expected to be added this year.

18,500 New Cars in 1914

Wisconsin took 18,534 new cars in 1914. The 1913 registration of private owners, amounting to 34,646, jumped to 53,180 in 1914, an increase of more than 50 per cent. And this in the face of one of the most depressing periods, industrially speaking, in the history of the state.

When the secretary of state of Wisconsin made his contract for 1914 license plates, the figure was 45,000, being based on a 34,646 registration in 1913. Before the year was half over the supply had run out and 8,161 additional sets of plates had to be purchased to supply the demand up to the close of activities. Last fall the secretary placed an order for 70,000 sets of plates, which means that he figures 16,839 new cars will be registered in 1915. If the secretary is as poor a guesser this time as he was last, the emergency supply being the same, Wisconsin's 1915 registration will be more than 75,000.

Why a Dairy State

Critics have often wondered why the state of Wisconsin, with its enormous agricultural and mineral resources, has only half as many cars as Iowa, or 14,000 less than Indiana, and less than other adjoining states. Without attempting to disparage in the least the charac-

Wisconsin Car Registration and Population by Counties

County	1910, People	1914, Cars	County	1910, People	1914, Cars
Adams	8,604	105	Marinette	33,812	280
Ashland	21,965	169	Marquette	10,741	242
Barron	29,114	497	Milwaukee	433,187	8,621
Bayfield	15,987	106	Monroe	28,881	402
Brown	54,098	853	Oconto	25,657	240
Buffalo	16,006	367	Oneida	11,433	89
Burnett	9,026	118	Outagamie	49,102	868
Calumet	16,701	566	Ozaukee	17,123	388
Chippewa	32,103	507	Pepin	7,577	149
Clark	30,074	498	Pierce	22,079	450
Columbia	31,129	853	Polk	21,367	372
Crawford	16,288	198	Portage	30,945	457
Dane	77,435	2,722	Price	13,795	99
Dodge	47,436	1,498	Racine	57,424	1,425
Door	18,711	283	Richland	18,809	586
Douglas	47,422	424	Rock	55,538	1,770
Dunn	25,260	510	Rusk	11,160	145
Eau Claire	32,721	572	St. Croix	25,910	528
Florence	3,381	52	Sauk	32,869	1,019
Fond du Lac	51,610	1,588	Sawyer	6,227	37
Forest	6,782	44	Shawano	31,884	468
Grant	39,007	1,270	Sheboygan	54,888	1,401
Green	21,641	819	Taylor	13,641	180
Green Lake	15,491	429	Trempealeau	22,928	429
Iowa	22,497	602	Vernon	28,116	658
Iron	8,306	34	Vilas	6,019	37
Jackson	17,075	258	Walworth	29,614	1,293
Jefferson	34,306	970	Washburn	8,196	87
Juneau	19,569	196	Washington	23,784	797
Kenosha	32,929	746	Waukesha	37,100	1,235
Kewaunee	16,784	325	Waupaca	32,872	761
La Crosse	43,996	942	Waushara	18,886	478
Lafayette	20,075	514	Winnebago	62,116	1,339
Langlade	17,062	205	Wood	30,583	523
Lincoln	19,064	226			
Manitowoc	44,978	1,020			
Marathon	55,054	704	Total	2,333,860	53,180

teristic tenacity and conservatism of the Teutonic race, it would seem that the answer can be found in this: Of the 2,500,000 people in Wisconsin today, approximately 1,000,000 are German born or of German origin. Thirty-three per cent. of the population of Wisconsin is native American stock. Forty per cent. is German. Twenty-nine per cent. is divided among Norwegians, Swiss, English, Canadians, Irish, Bohemian, Belgian, Austrian, Polish, Dutch, Finns, Danes and Italians.

The peculiar character of the population of the state, however, is a powerful factor in determining the cause of the immense dairy industry. Wherever a population map shows Germans, Swiss and Danes thickly settled, a dairy survey map shows a predominance of creameries and cheese factories. It is their inheritance. The fact that the Norwegians, who are second in number to the Germans, have not generally taken to dairying, but prefer to raise tobacco, indicates that dairying is not acquired as a result of Wisconsin influences.

47 People Per Car

Last year's registration of 53,180 shows exactly that number of cars distributed among approximately 2,500,000 people, or a ratio of about 1 to 47. A glance at the list of sparsely settled counties in the wilds of northern Wisconsin shows few automobiles. For 2 years a monumental effort has been under way to develop these sections, and the campaign is already bearing fruit. There are several counties having less than 100 cars and a few under 50. The splendid system of state aid highway construction in Wisconsin has reached these districts and just as sure as the automobile follows the good road, when it does not actually inspire good road work, so will these districts during 1915 and coming years increase their car population, and in a much greater proportion than the more thickly settled portions.

$260,000,000 in Livestock

State distributors who do business from Milwaukee are almost unanimous in predicting that 1915 sales will make their mark on the basis of farmer trade. The farmer has money; that is positively indicated by the vast gain in deposits shown by country bank reports this month. The farmer has been a good customer of the automobile builder, but only the surface has been scratched. The income from $260,000,000 worth of livestock this year and last will make expenditures of $500 to $1,200 for cars a drop in the bucket. The worth and value of mechanical appliances on the farm has long ago been demonstrated and with it an ever-growing estimate of the economy of the motor car on the farm inculcated. The college of agriculture of the University of Wisconsin, with its excellent extension service, has seen to that. Its bulletins even today concern themselves as much about the care, repair and maintenance of automobiles as about farm machinery.

Population of Wisconsin Cities Over 10,000

City	Population
Milwaukee	419,054
Racine	44,528
Superior	44,344
Oshkosh	35,097
La Crosse	31,367
Madison	29,468
Kenosha	29,062
Green Bay	28,064
Sheboygan	27,863
Fond du Lac	20,367
Eau Claire	18,647
Wausau	18,352
Appleton	17,492
Beloit	17,122
Marinette	14,610
Janesville	14,195
Manitowoc	13,563
Ashland	11,594
Total	834,789

Wisconsin was the center of the epidemic of foot-and-mouth disease during the past winter. But the losses occasioned by the wholesale slaughter of cattle are insignificant compared with the total value of all cattle owned in the state.

Unfortunately the state law providing for automobile registry does not give the secretary of state's office sufficient leeway to undertake a statistical digest of present registrations by names of makes. Naturally, the Ford predominates, both in city and country. Overland, Buick, Maxwell and Studebaker follow in the low-priced car sales. Case and Mitchell, Wisconsin products, make a surprising showing in the medium-priced car line. Rough estimates give an average value of $900 per car in Wisconsin.

33,575 Cars Registered

So far this year, or on March 31, to be exact, the Wisconsin registration is 33,575 with more coming at 800 per day. This is more than half of the entire 1914 registration. A year ago at this time the private owners' registry amounted to only 17,250.

Money Is Plentiful

The past winter has been ideal from the crop growers' standpoint; the banks are filled with farmers' money; the dairy herds are ready to produce a wealth greater than during last year, so it is reasonable to expect the farmer of Wisconsin to be the prime factor in car buying for 1915.

1 Car Per 39 People in Ohio—Registration by Counties

COLUMBUS, O., April 3—According to statistics compiled by State Registrar of Automobiles W. H. Walker, 120,296 automobiles and trucks are owned in the eighty-eight counties of Ohio, the total population as reported in the 1910 census being 4,696,861, or thirty-nine people for every car and truck owned in the state. The report of registrations by counties follows:

County	1910, People	1914, Cars	County	1910, People	1914, Cars
Adams	24,755	253	Lorain	76,037	1,808
Allen	56,580	1,746	Lucas	192,738	5,425
Ashland	22,975	820	Madison	19,902	693
Ashtabula	59,547	1,371	Mahoning	116,151	3,721
Athens	47,795	698	Marion	33,971	1,181
Auglaize	31,246	819	Medina	23,598	735
Belmont	76,856	968	Meigs	25,594	232
Brown	24,832	349	Mercer	27,536	881
Carroll	15,761	280	Miami	45,047	1,295
Champaign	26,351	694	Monroe	24,244	264
Clark	66,435	1,556	Montgomery	163,763	4,543
Clermont	29,551	325	Morgan	16,097	172
Clinton	23,680	687	Morrow	16,815	431
Columbiana	76,619	1,658	Muskingum	57,488	930
Coshocton	30,121	537	Noble	18,601	182
Crawford	34,036	1,026	Ottawa	22,360	685
Darke	42,933	1,399	Paulding	22,730	747
Cuyahoga	637,429	19,260	Perry	35,396	685
Defiance	24,498	861	Pickaway	26,158	863
Delaware	27,182	708	Pike	15,723	135
Erie	38,327	943	Portage	30,307	779
Fairfield	39,201	1,359	Preble	23,834	1,051
Fayette	21,744	637	Putnam	29,972	857
Franklin	221,567	6,484	Richland	47,667	1,132
Fulton	23,914	1,036	Ross	40,069	860
Gallia	25,745	218	Sandusky	35,171	1,261
Geauga	14,670	366	Scioto	48,463	698
Greene	29,733	764	Seneca	42,421	1,597
Guernsey	42,716	631	Shelby	24,663	808
Hamilton	460,732	7,542	Stark	122,987	3,440
Hancock	37,860	1,589	Summit	108,253	3,951
Hardin	30,407	1,078	Trumbull	52,766	1,389
Harrison	19,076	414	Tuscarawas	57,035	1,113
Henry	25,119	1,015	Union	21,871	633
Highland	28,711	580	Van Wert	29,119	966
Hocking	23,650	347	Vinton	13,096	71
Holmes	17,909	352	Warren	24,497	562
Huron	34,206	1,118	Washington	45,422	560
Jackson	30,791	242	Wayne	38,058	1,006
Jefferson	65,423	1,024	Williams	25,198	1,247
Knox	30,181	863	Wood	46,330	1,880
Lake	22,927	856	Wyandot	20,760	746
Lawrence	39,488	334			
Licking	55,590	1,552			
Logan	30,084	722	Total	4,696,861	120,296

The Engineers' Forum

Piston Ring Problems—Defends Compound Type—Eliminating Glare from Headlights

ST. LOUIS, MO.—Editor THE AUTOMOBILE:—The writer is much interested in the rather lengthy dissertation on piston rings which appeared in THE AUTOMOBILE for February 25. Some admissions by Mr. Enderbrock were very agreeable but the writer's experience in this branch of the automobile industry makes it necessary for him to take exception to some of Mr. Enderbrock's versions.

Mr. Enderbrock admits in the first few lines of his letter that the compound angular section ring is the most efficient and for that reason this type of ring was used, yet he winds up his paper with all his conclusions pointing to the older and most obsolete concentric single-piece ring as his ideal. Surely either Mr. Enderbrock, or the combined opinion of hundreds of automobile engineers of the present day, is wrong. There was a time when the single concentric ring was used almost universally but the irresistible process of elimination has relegated this construction to the background, to make way for the eccentric and even better construction—the compound angular section ring.

Uniform Radial Pressure Required

The first and most essential requirement in a piston ring is that it must exercise a uniform radial pressure from its center against the cylinder walls at every point in its circumference. This is impossible with a single concentric ring. It is useless to have a pressure acting on the cylinder wall at one point stronger than at another point, for if the pressure at the heavy point is correct, the pressure at the light point is not sufficient and, conversely, if the pressure at the light point is sufficient, there is a great loss of power in friction at the point where the pressure is heavier. It is further essential to have the rings fit, that is, to a very close limit to the bottom of the piston head groove so as to eliminate any large gap beneath the ring, thereby insuring an oil film behind the ring.

The concentric ring has one point to its credit, and that is, because of its concentric form it has the same thickness all around, which makes it possible to fit the ring very closely to the bottom of the piston head groove. It also has the advantage of a wide uniform bearing on the side of the piston grooves. The one great defect, however, which serves to disqualify it for use, is that at no point in its circumference does it have the same pressure against the cylinder walls, and the result of such ring action is obvious.

The Eccentric Construction

In the eccentric ring the above-mentioned defect is eliminated to a great extent by varying the thickness of the ring at different points, and, by doing so we vary the stresses at the different sections, so that the tension at these sections, which is proportional to the stresses, is uniform. Assuming that the eccentric ring gives us uniform tension at all points we sacrifice the broad uniform bearing on the sides of the groove and since this is a very important feature we cannot consider the eccentric ring the ideal construction.

Advantages of Concentric Rings

It can be clearly seen that the concentric ring has in its favor the wide uniform bearing on the sides of the slot but has the disadvantage of lacking uniform radial pressure. The eccentric ring has the advantage of a uniform radial pressure but fails with its bearing on the piston grooves, since eccentric construction necessitates a varying thickness throughout. If two concentric rings having equal sections are placed one within the other with the openings opposite or at 180 degrees, it matters not where the weakness is on either ring since the weak point of one ring being in contact with the strong point of the other and vice versa, the radial tension is bound to average up in a uniform manner. By this means a uniform radial tension is obtained and by the use of concentric construction in both rings, the wide uniform bearing on the sides of the groove is secured. This construction is indeed the last word in piston ring design and certainly proves its superiority in actual practice. Other details such as closing the slot and the like are only minor features and have no direct bearing on the fundamental features of an ideal ring.

Mr. Enderbrock mentions that if a compound ring is allowed to become rusty where the two halves intersect, the spring action is retarded due to friction between the corroded parts. This may be true, but the writer has never found a piston ring corroded or rusty where the engine has been run any length of time or any oil used at all. The carbon deposit which is often found behind and about rings has absolutely nothing to do with the piston ring itself. If a piston is improperly designed and poorly cooled, the small film of oil which is always present in and about a ring will surely be flashed into a gas and the remaining carbon deposited thereabout. If a piston is properly made and properly cooled one could keep the rings flooded in oil and never find any carbon as long as the oil did not get up into the firing chamber. Piston rings which have allowed oil to pass freely into the combustion chamber have been found to be absolutely free of carbon, and yet the combustion chamber and parts thereof were heavily coated with carbon.

A Question of Material

Mr. Enderbrock makes a statement that the compound ring gives wonderful results for a short time but that the efficiency decreases with age. That is a question of material and not of construction. If the proper material is used in a piston ring it should be just as efficient after it has been used for a time as it was when new, neglecting, of course, the slight wear which must be expected with any construction. There is also no reason why the double compound ring should wear any faster than the ordinary ring; it should not wear as fast, because even though the pressure may not be any greater than the ordinary ring, this pressure is uniformly distributed and the wear will also be better distributed.

A Test by Air Compressor

One of the largest manufacturers in the country ran an extensive test on the improved type eccentric and the compound angular section ring. He used a special air compressor for this test, his reason being that in a gas engine, if the rings have a slight leak each stroke, it is hard to de-

termine it, since each cycle of a gas engine clears the boards for a new one and small leakage errors are hard to detect. In the special compressor, every loss, however small, is registered in the tank and at the end of 5,000 revolutions or more, all these little leaks which occurred at each stroke are summed up and show clearly on the tank gauge in their true light. Fig. 1 shows the results of the test.

This test shows clearly the superiority of the compound angular sectioned ring over its predecessor, the eccentric ring. The test was conducted independent of the writer or any ring manufacturer and was run for the users' own satisfaction.—A. J. MUMMERT, Engineer, McQuay, Norris Mfg. Co.

Bend Headlight Supports to Throw Glare on Road

DETROIT, MICH.—Editor THE AUTOMOBILE:—For some time the subject of over-brilliant automobile headlights has been agitated by the authorities. The points made against them in view of the dazzling effect on the eyes of the drivers in other cars are undoubtedly well taken, but the proposed remedy of either dimming or diffusing the light would only relieve the driver of the approaching vehicles and at the same time destroy their efficiency from a road lighting standpoint. Good illumination is certainly necessary on the side streets.

Brilliant and intense as the best headlights seem to an observer who is looking into them from another car, the aspect is entirely different from the driver's position behind them, and, even with the best ones, very careful watching is necessary to discern such objects as pedestrians, for example, or the unlighted horse vehicle so frequently encountered.

Mount Lamps at an Angle.

A complete remedy for the headlight nuisance, so simple and so obvious that to merely call attention to it would seem sufficient for its carrying out without compulsory laws, is the mounting of the lamps at a slight angle to deflect the rays downward.

As we all know, the principle of the parabolic reflector incorporated in the modern headlight is to cause the light to leave the lamp in parallel rays, resembling when viewed on a slightly foggy night a perfectly straight bar or long cylinder. The lamps being mounted at a point below the eye level of the pedestrian and still farther below the eye level of the car driver, it is perfectly evident that if this parallel bar of light were directed slightly downward that only a few scattering diffused rays would reach the eyes of the approaching individual.

The improvement is also very great to the man behind the lights so mounted, as it is perfectly evident it is the road he wishes to see, not the surrounding foliage, or even clouds in some cases, as one would be led to believe from the upslanting lights on some of the cars passed.

A heavy monkey wrench used on the bracket just below the lamp will serve to bend it. A little experiment will place the light on the road according to each driver's preference, as those that drive faster will naturally prefer less dip and longer reach of light than the more deliberate drivers, who will enjoy the intensely illuminated oval of light drawn close to the car by a somewhat greater extreme of angle, serving to reveal without eye strain the minutest chuck hole and show in ample time any obstacle which may appear.

Headlights Directed at Random.

Referring again to the present care-free way that the average car lights are directed, some skyward, some sideways, like a wall-eyed horse, and some a combination of both, the lights are certainly blinding to approaching drivers, and their usefulness curtailed to their own drivers to the same degree that they become a nuisance to the others.

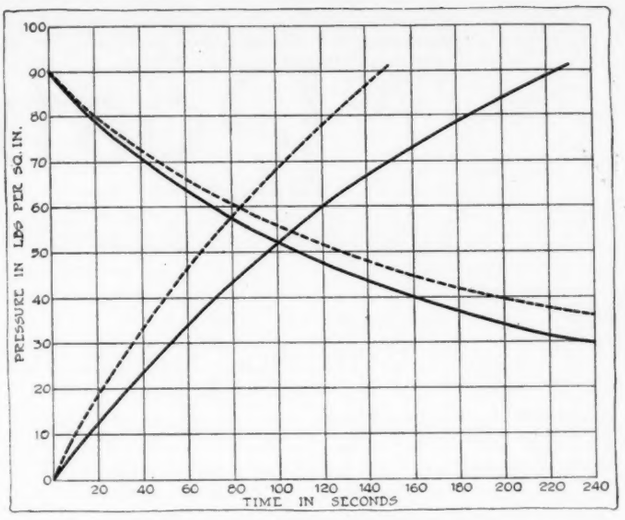


Fig. 1—Comparative pumping and leakage curves for plain eccentric piston rings, shown in black, and for compound angular, shown dotted

A powerful headlight is one of the greatest factors towards safety in night driving, and to propose a remedy of dimming them instead of properly directing them is as absurd as to propose regulating a derelict machine with a broken steering gear by taking the engine out of it instead of repairing the steering gear.—CHAS. H. KIRBY, Chief Engineer Carbureter Division, Detroit Lubricator Co.

Thinks Oversize Tires Increase Comfort and Reduce Expense

NEW YORK CITY—Editor THE AUTOMOBILE:—There has been considerable discussion of the merits of oversize tires. We believe in their use principally for the following reasons:

Take, for instance, a 33 by 4 tire which fits on a 32 by 3 1-2 rim, in addition to having considerable more air capacity or cubical contents there is naturally a little more tread and the oversize tire is, generally speaking, of a heavier construction. The greater air capacity naturally makes more of a cushion, thus making the tire easier riding for the occupants, and, due to the advantages mentioned above due to the fact that the tire is of heavier construction and has a greater air capacity, it will throw off strains which a tire of similar diameter and circumference would not throw off.

In addition to the above, the circumference of the oversize tire in this instance is slightly over 3 inches more than the 32 by 3 1-2 which we are using for illustration. This additional running surface means, of course, that the tire will revolve fewer times in making a mile than the 32 by 3 1-2, which, everything being equal, should insure greater mileage than the smaller size tire.—R. R. DRAKE, Manager Service Department, United States Tire Co.

Ontario Favors License Reciprocity with U. S.

WINDSOR, ONT., April 3—The members of the board of trade of this city have gone on record as favoring reciprocity of automobile licenses with the United States. They also expressed their opinion that it would greatly interfere with the tourist traffic if a new horsepower tax on automobiles of non-residents is imposed.

Minneapolis Speeders to Lose Cars 1 Year

MINNEAPOLIS, MINN., April 3—Every Minneapolis automobilist who violates the traffic or automobile laws in the future will be deprived of the use of his machine for a full year, according to an edict issued by Police Judge Smith.

Criticises Suggestions for Metric System

EDITOR THE AUTOMOBILE:—Your remarks on page 365 of THE AUTOMOBILE for February 11, on filtering gasoline are to the point, but should include catching lint which most gasoline contains in considerable quantity. This lint is derived from the cotton strainers through which the fluid is passed in its process of manufacture and traps will not catch it. It must be caught by fine screens or by chamois strainers. These screens in time clog and refuse to pass the fluid. On metal screens the layer of lint can be easily seen and lifted off. The most practical protection which I have ever used is a large tubular screen soldered to the tank outlet cock and sticking up into the tank. The flow into the carbureter being much slower than the movement of the contents of the tank under the motion of the vehicle permits the lint to be washed off the screen instead of collecting in a liquid tight layer thereon.

New Weight System Not Objectionable

Mr. Vivier's suggestions for introducing the metric system are faulty. While there is not so much objection to a new weight system, there is every objection to a new system of measures, and theory no matter how good looking, must take into consideration the facts or somebody suffers. Forcing people to do things the way some theorists think they should be done is not in accord with the freedom we are trying to maintain in this country.

In certain lines of work it is just as easy to use one measurement as the other and there is no objection to a new line of work making its measurements in that system which seems most world wide; but it is wrong to force any of us to fool with the metric system when we want a pane of glass for a window made 40 years ago or a new pipe fitting for the gas pipes in the same house. In short, measurements of length are tied to the past and no law can untie them. It would simply introduce another system where we have too many already. It would lengthen our troubles instead of shortening them. It would hamper our business instead of helping and we of America, trying to uphold higher wages and a higher form of civilization, need help from our law makers rather than hindrance. Every maker of any line of goods knows how disastrous a change in designs is, unless there is a decided gain of some kind. This gain is not to be found in the mere substitution of a measuring system. Most workmen today have metric tapes and scales in their possession but they do not use them. They are not so handy. They do not think in their terms. They mean less to them. To force their use would slow up production. "915 millimeters" (see table on page 365) is a mouthful as compared with 36 inches. No man can grasp the former dimension so easily as the latter. Nor can he speak it and write it so quickly. And its very existence is condemnatory. Why do its advocates say 700 millimeters instead of 70 centimeters or better still, 7 decimeters? Simply because it lacks much of practicability. Instead of introducing by law a new system we had much better wipe out some of the less used old ones such as apothecary's and troy weights, long tons, 112-pound hundred weights, nautical miles, several different ells still used abroad, 2 or 3 sizes of gallons, quarts, etc. We need uniformity in our own work and land much more than we need to fit our factories to an arbitrary system forced on the people of other lands. The bulk of our business is at home and such measurements as are needed for our goods in foreign markets can easily be supplied in makers' catalogs, without greatly changing the goods themselves. So long as a foreign buyer can get tires that fit his rims he does not worry about our specifying their size in inches. It would be a valuable thing to have our rims of such size but the metric system will not accomplish this. I use tires as an example because of the metric size table on the same pages as Mr. V's letter. In other words a world-wide adoption of standard sizes may be a valuable thing and we should work with other nations to this end. But that we should greatly inconvenience our production and handicap our manufacturers to no particular end is a totally different thing and should be fought by all interested in the commercial growth of our country. If Mr. V. will tell us how to stop people from saying penny when they mean cent, or bit, levy, etc., when they mean 12 1-2 cents, or shilling when they mean 25 cents, we will then believe that he could in time suppress the present measurements but who can measure the loss to the country in making such a change? Several generations would die before our people would think as readily in the new system as in the old. In fact they never would, because a yard is a much better unit than a meter. It is divisible into halves, quarters, thirds, sixths and twelfths without producing fractions while the meter is only divisible by 2 and a thousand apparently, since the use of decimeters and centimeters is not common. Try it yourself. How many people can read a scale marked into groups of five millimeters and figured every ten, as easily as a scale marked into sixteenths, eights, quarters and halves and figured every inch? Most people count by twos and threes, not by fives.

Philadelphia, Pa. CHARLES E. DURYEA.

Lapping Piston Rings Requires Experience

Editor THE AUTOMOBILE:—We have an Overland car model 60 T, one cylinder of which will not hold the compression very well. The cylinder is in good shape. I put two new rings in and I think they do not fit well enough yet as the car has only been run about 30 miles since they were put in. The compression was fairly good with the old rings.

Is there any way that they could be made to fit any tighter by using some kind of a grinding compound?

Do you think they will be tight after the car has been run 400 or 500 miles?

Napoleon, O. L. HUGHEY.

—In order to get the new rings to fit well at once they should be lapped in by means of a grinding compound. The cylinder is put on a bench and the piston worked out and in with a sort of irregular turning movement similar to that given in grinding a valve. This work can be done by an ama-

teur but should not be attempted without first having observed carefully how it is done, because it is easy to spoil the piston and cylinder by unequal abrasion. The probabilities are that the new ring will wear in and the compression will be tighter after you have run another 200 or 300 miles, and altogether it would probably be better for you to wait and see that this does not happen unless you can get the services of an expert in lapping in the ring.

Slips Out of Second Gear

Editor THE AUTOMOBILE:—I have a 1915 Maxwell model 25 with which I have had some trouble in the way of slipping out of second speed. Is this trouble a common feature for this type of car or is it individual?

When I am going up a long hill in second speed the lever will slip back to neutral in spite of all that I can do. About every 50 or 75 yards I have to release the clutch and push the lever back into second.

2—What is the gear on high, intermediate and low?

Littleton, N. H. W. M. SILSHY.

—This complaint is exceptional with this car and not found generally among users. It is impossible to give exact information without the serial number of the car. It is probable that the second-speed sliding gear is badly worn, or the tension on the spring which holds the gear-shifting rod in place has been weakened. As this car is probably within its guaranteed period it would be best to take the matter up directly with the Maxwell Motor Sales Corp., which has field mechanics throughout the territory who will investigate the trouble.

2—High 3.58 to 1, intermediate, 6.21-1, low, 10.48-1.

Angularity of Connecting-Rod Explained

Editor THE AUTOMOBILE:—In THE AUTOMOBILE for February 11 in the article on Engine Balance and Vibration it is stated that a piston covers more than half its travel on the last half of the upstroke and less on the first half, while in the issue for February 25, the article Light Pistons Make Smooth Motors says: "We have seen that a rising piston moves faster and faster during the first half of the upstroke and then slows down again as the crank comes toward the top."

As I study your articles on such subjects I would appreciate your explanation of the difference of opinion.

Ilion, N. Y. R. B. FISK.

—The article on engine balance and vibration analyzed the motion of the piston in detail and explained how, owing to the angularity of the connecting-rod, the piston does cover more than half the stroke during the second half of the upward crank movement, that is during the last quarter turn of the crank. In the article on light pistons the author was not considering the matter in such detail and merely wished to point out that the piston is stationary for an instant when the crank is at the bottom of the stroke and that it is similarly stationary at the top of the stroke. On the way up it is first accelerated and then retarded, the change from acceleration to retardation taking place at approximately half stroke.

Aeroplane Design Used for Racers

Editor THE AUTOMOBILE:—Can you advise me through THE AUTOMOBILE if aeroplane motors have been used in racing cars and, if so, what results were obtained?

2—About how many revolutions per minute will these motors turn up?

Katonah, N. Y. J. A. B.

—Motors designed for aeroplane work have been employed very successfully by the Mercedes company in its French Grand Prize cars. It will be remembered, however, that these were not purely aeronautical motors but were adaptations that borrowed suggestions from the aeroplane design as far as pistons, connecting-rods, etc., were concerned. In the automobile motors, however, four valves were used in order to run the rotative speeds up to a much higher degree than they were adapted for in the aeroplane stock job.

2—While the aeroplane motors could not revolve at more than 2,000 r.p.m. these racing automobile motors developed over 4,000 r.p.m.

Motor Knocks on Hard Pull

Editor THE AUTOMOBILE: I have always been bothered with motor knocking when throttle was opened on a hard pull necessitating my retarding the spark to the extreme limit, and that, of course, reduced power.

I have been told by several different garage men that it was caused by too high compression and they advise reducing compression by raising the cylinder and placing a plate beneath to make a larger compression space, Fig. 1. Do you think this would do any good? If given more space, would it not reduce power?

Kankakee, Ill. U. S. SHREFFLER.

—The high compression reason which has been assigned to your case is very possibly correct, although it might be that carbon trouble is at the bottom of the difficulty. If you have noticed that the knocking continues even after the motor has been cleaned of carbon, it is probably due to the high compression or to a loose connecting-rod, wristpin or crankshaft bearing or part. It is never a good idea to reduce compression until you are sure that it is too high and it will be better to have this measured by gauge and see what it really is before attempting to cut it down by means of a plate. A compression pressure of 70 pounds is sufficient and for ordinary purposes you should not have higher than this. If it is below this a reduction of compression will reduce the power correspondingly, as it influences the mean effective pressure in the cylinder.

Worn Parts Must Be Replaced

Editor THE AUTOMOBILE:—Please explain why the push rods on my 1912 E. M. F. back down. I have adjusted them tightly.

2—I also have trouble with the oil leaking out of the push rods.

3—How many miles should this car run on 1 gallon of heavy oil? I get 225 to 250 miles on a gallon.

4—Is there any way to inclose valves on this car so that inclosing parts could be taken off easily?

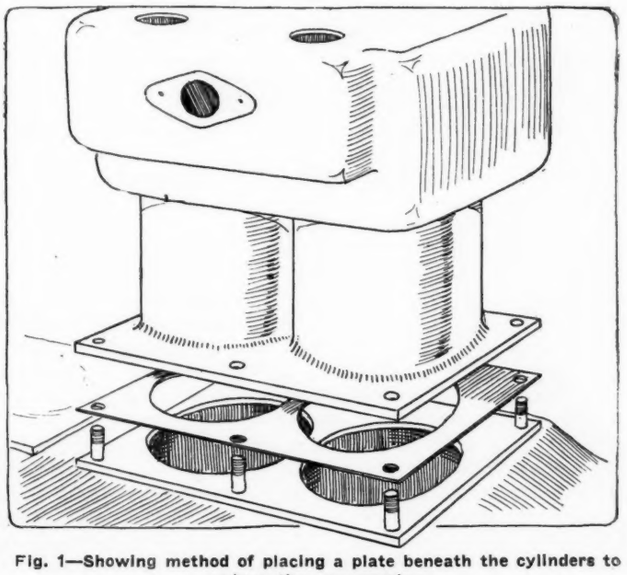


Fig. 1—Showing method of placing a plate beneath the cylinders to reduce the compression

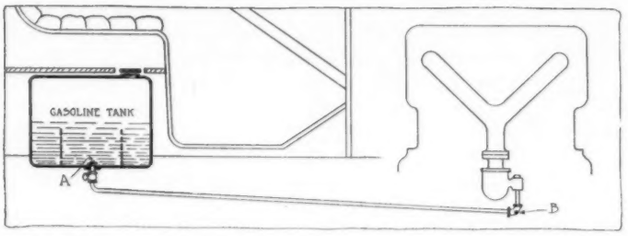


Fig. 2—Points in gravity feed which are likely to become clogged: A—At the point where the gasoline leaves the tank into the gasoline carbureter feed line; and B—the elbow or connection of the carbureter to the gasoline feed line

5—Where does the new Mercer car get its power with a bore of 3.75 rated at 22.5 horsepower?

Philadelphia, Pa. FREDERICK MUNZ.

—The probable reason that the push rod adjustment does not remain permanent is that the threads on the push rod adjusting screw or the lock nut are worn, necessitating the replacement of these parts.

2—The leakage of oil from the push rods can be attributed to worn push rods or push rod guides and in order to eliminate it the worn parts should be replaced.

3—If you secure 240 miles to the gallon of oil on this car, you are attaining a fair average, as at this rate your oil cost will be only about .25 cent per mile.

4—You could probably make up plates out of sheet tin or some other material easily cut and bent which would inclose the valves on this car. A method which has been used occasionally with success is to inclose the valves in individual tube housings of telescopic slotted design arranged in such a manner that the smaller portion can be slid into the larger, thus enabling the operator to reach the valve adjustment nut. If you use a housing which is fastened to the side of the motor be careful not to tap into any waterjacket material as this is thin and when once pierced it is difficult to maintain a tight connection.

5—The power of the Mercer is attained by high rotative speeds and long strokes. Although the S. A. E. rating of this motor is 22.5 horsepower the Mercer company claims 70 horsepower on the block. This at first would not seem logical but it must be remembered that the S. A. E. rating is based on a piston speed of 1,000 feet per minute whereas at full power the new Mercer motor develops far more than this speed.

Maxwell Company Making New Cars

Editor THE AUTOMOBILE:—Will you kindly tell me if the Maxwell company of today is the same as that originally started, or has that concern gone into bankruptcy?

2. Is the firm building the some cars today as a few years ago?

3. Is the same motor used? If a new motor is employed kindly give the bore and stroke of the old motor. Also the piston displacement.

4. Kindly give the specifications of the motor as now manufactured.

Isanti, Minn. EDWIN BOSTROM.

—The Maxwell company of today is an entirely separate concern from the original Maxwell, but is an outgrowth of the former in many ways. The present concern is handling the previous parts and is continuing the service work of the old Maxwell company.

2. The cars which it is building today are entirely different from those made a few years ago.

3. The same motor is not used. It is impossible to give you the bore and stroke of the old motor without knowing to which model Maxwell you refer. There were several of these, and if you will give the exact year to which you allude the full specifications can be furnished.

4. The Maxwell 25 which is now being built is a four-cylinder 3.625 by 4.5 design, having L-head cylinders cast in a single block. The valves are on the right and cooling is by thermo-syphon, oiling by splash and ignition by a dual system.

Gasoline Line Apparently Clogged

Editor THE AUTOMOBILE:—I own a 1912 Haynes model 20. On a level road or slight ascent, the car runs well, but on steeper grades it misses, chokes and backfires. I had new rings put in and the compression seems good. Stromberg carbureter was sent to maker recently and overhauled. The magneto seems to be O. K. Have tried different levels of float, but nothing helps. Sometimes it chokes on the level, but a momentary shifting to second or often opening air wide for a moment stops it.

Hazleton, Pa. J. H. D.

—From the information given, it would appear that the gasoline line between the carbureter and the tank is slightly clogged. The gasoline flows through rapidly enough to feed the car under conditions obtained on the level road or on a slight ascent, but on steeper grades the feed is not fast enough to do the work. If you will remove the pipe connecting the tank and the carbureter and clean it out thoroughly it will probably end the trouble. See Fig. 2.

Position of Spark Plug Is Important

Editor THE AUTOMOBILE:—In a gasoline engine do you get any more power from the explosion by having the spark plug directly in front of the piston rather than at one side in a boss or recess?

2—Can you clean the carbon out of the cylinders by burning it out, or is it as well to scrape it out by taking the cylinders out?

3—Does it harm a high-tension magneto, that is, where a car is run by one alone, to shut off the spark going down hill and brake with the gears? Is this the best thing to do on a steep hill? And could this harm the cylinders?

Strong, Me. L. T. HUNTER.

—There are two theories relative to the location of the spark plug in a recess within the cylinder. One is that by having the spark plug in such a recess, a spurt of flame enters the combustion space from the recess and as a result quickly ignites the charge. Another theory is that by having the spark plug directly in the center of the combustion, or, that is, so that the spark plug points project outward into the combustion space itself, the gas is quickly exploded because it gives the flame a chance to propagate itself in all directions. Practice favors a plug which merely has its points projecting into the combustion space, see Fig. 3.

2—Carbon can be very efficaciously burned out of the cylinders by the use of oxygen. It can also be taken out by scraping.

3—It does not harm a high-tension magneto to do this because there is a safety spark gap which provides the resistance to the current and gives it work to do other than breaking down the insulation. The practice of using the motor as a brake will not harm the cylinders but it is said to put considerable wear on the gears due to the reversed action of the reduction. That is, if the car should be geared 4 to 1 when the motor is acting as a brake, the reduction acts in an opposite direction and becomes 1 to 4.

Hot Air Apparatus Would Stop Trouble

Editor THE AUTOMOBILE:—My car is fitted with a model L Schebler carbureter. Last fall it began to skip every time the throttle was changed, and no amount of adjusting would stop it. This winter I had the car torn down and thoroughly overhauled but the carbureter is still troublesome.

It will run perfectly until the throttle is changed and then it does not seem to adjust itself for a number of revolutions,

when it will take hold and run beautifully until the throttle is changed again. It will skip, spit back through the carbureter, fire in the muffler and, if on a hill, it will die. It always ends by throwing a lot of gasoline out of the carbureter and when the engine stops it will leak from a teaspoonful to a tablespoonful.

Clayton, Mich. M. R. S., M. D.

—The first test you should make is to ascertain whether or not you have any leaks around the intake manifold, that is, between the engine and the manifold and also between the manifold and the carbureter. When the car is running idle, see that there is no gasoline leaking.

Should you find that there are no leaks, it is advisable that you use an exhaust sleeve or drum around the exhaust manifold flexible tube running to the air bend in the carbureter, as by using this hot air you are able to keep the heavy gas from precipitating on the walls of the manifold and from running back to the carbureter when the car stops. With the extremely heavy gasoline which we are now getting, in order to assist in the vaporization and to hold this heavy gasoline in suspension, it is desirable to use hot air through the low-speed air opening. If these adjustments are followed and there are no leaks there should be no further trouble.

Battery Should Last 2 Years

Editor THE AUTOMOBILE:—Will you kindly tell me through the Rostrum how long a storage battery should last before becoming useless, provided it is given proper attention during its life?

Following are a few ideas which may be of interest to other readers:

1—To stop rattling of scissors-type shock absorbers, without tightening up the bolts until the car rides hard, I inserted two thin rubber disks, cut from an old tube, one each side of each wooden washer as furnished.

2—I rub the springs thoroughly each week with a rag soaked in kerosene and notice a surprising difference in riding qualities and also complete absence of spring squeaks.

3—As soon as a tire has gone 4,000 miles, I insert an inner liner around the tube and then use the tire until worn through. As a result, I have had no tire change on the road in a year and a half, about 12,000 miles, and have averaged nearly 10,000 miles per tire and tube, in spite of the fact that I keep but 40 pounds pressure in front and 50 pounds in rear tires, thus causing easy riding. I do not cement liner in tire but very little, as it is otherwise hard to remove.

4—I soften the leather of a cone clutch with kerosene every 2 weeks and have ideal clutch action.

5—I wash body myself with slightly warm water, and when dry, give well-rubbed-in application of liquid veneer with cheesecloth. As a result, body retains its gloss, although run practically every day for a year and a half in all kinds of weather.

Providence, R. I. W. B. FREEMAN.

—A storage battery which is serving a lighting and starting system has such a variable life owing to different degrees of good care and strenuosity of service, that it is impossible to fix a figure. It may be conservatively stated, however, that such a battery should have a life of 2 years or more.

Front Wheel Drive To Avert Skidding

Editor THE AUTOMOBILE:—It has occurred to me, when trying to negotiate slippery roads, that if the power was applied to the front instead of rear axle it would tend to obviate dangerous skidding. Kindly inform me if this method of applying power has been tried out on passenger cars, if so, is it practical and why has it not been adopted?

Conneautville, Pa. W. H. P.

—In 1906 Walter Christy of New York made a car in which the front wheels were used for both driving and steering.

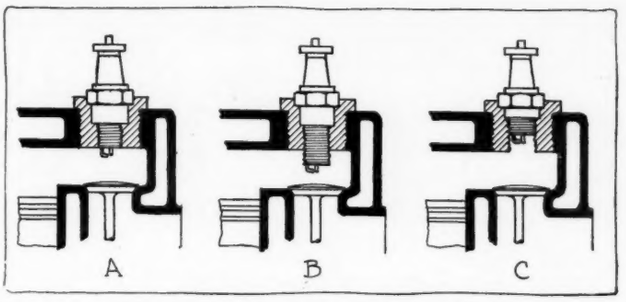


Fig. 3—A—Proper spark plug length. B—Spark plug too long. C—Spark plug too short

This was a development of the racing car in which the same scheme was employed and which managed to make a mile on a beach course in 35 1-5 seconds. In this car the motor which was a four-cylinder vertical design instead of being placed in the usual fore-and-aft position, was hung directly between the front wheels of the car with the crankshaft extending across. In fact, the crankcase of the motor, which was of manganese bronze, formed the front axle, and the drive was transmitted directly to the front wheels through suitable gearing and universal joints which permitted the wheels to swing on pivots for steering.

There was no differential used on this car and no driving sprockets on the rear axles or wheel. This permitted the body to be dropped very low and the car was of distinctive appearance for that time on this account. Owing to the placing of the motor at the front end of the car, the radiator was placed directly against the dash and the steering column passed through an opening in the radiator. This was a standard stock design and was regularly put on the market in September of 1906.

The drive is not practical owing to the complication of the driving and steering members and so has been abandoned.

Repair Parts for Warren Cars

Editor THE AUTOMOBILE:—Can you inform me what motor the Warren Motor Co. used in its 1913 six-cylinder car?

2—Also, kindly let me know where parts for the Warren car of 1913 design can be obtained.

3—What is the bore and stroke of the motor used in the 1913 six-cylinder model Warren? I am informed that the Warren Motor Co. is no longer an active concern.

Troy, N. Y. T. J. QUILLINAN.

—The motor used in this car was made by the Port Huron Construction Co., of Port Huron, Mich.

2—Parts for the Warren car including the 1910, 1911 and 1913 models 35, 30 and 40 and a large number of the six-cylinder parts can be obtained from the Puritan Machine Co., Detroit, Mich.

3—The 1913 Warren six had a bore of 4 inches and a stroke of 5 inches.

Wants Sizes of Fiat Racers

Editor THE AUTOMOBILE:—I have been puzzled on the size of racing cars and the engines therein. I believe that the Fiat people have in the past made the largest automobile racing motor. Is this correct?

2—Please give me the exact measurements of the largest Fiat ever built? Also the measurements of the Fiat.

Culver Military Academy, Culver, Ind. DUNCAN S. NEASE.

—The largest Fiat of which we have record is that in which Nazzaro appeared in 1911 at Brooklands. The dimensions of this car were 9.4 by 12.59. This car was too hard to handle.

2—This is covered under question 1 as regards the first part. The Duray Fiat which was driven at Ostend is a four-cylinder 7.48 by 10.4.

Discussion of "The Improvement of Spring Systems"

Revised Figures by Fellowcraft on Forces of Road Shocks

By M. C. K.

ALL who read the valuable contribution by Fellowcraft in the issue of March 18 on the actual proportions between the destructive forces which are toned down by both springs and tires in motor vehicles and those which are endured without any other mitigation than that which air tires may afford, will be still more interested in the revised presentation of the same subject which follows and in which he sets forth with remarkable stringency and clearness such an application of physical science to the solution of the problem involved as must appeal to any capable engineer. When M. C. K. first called attention to the neglected values of the horizontal shocks, the first consideration was to open up the subject and make it accessible with a minimum of effort on the reader's part. It seemed more important to show approximate than accurate values, if at the same time those things could be included in the reasoning which eventually must be found important in practice but which at present are too indefinite or complicated for any readable academic treatment. One of these factors is the DURATION of a shock, as it is so strongly affected by even the slightest resilient element in the vehicle as to invalidate the intended comparison of the theoretically rigid vehicle with any automobile or truck actually built or to be built. For this reason the values were figured or estimated in terms of work, which leave the time element of the shock itself out but from which the destructive force of the shock can be figured in any given case when time and space both become reasonably well ascertained. In the following presentation of the subject Fellowcraft arrives at values in terms of work which agree near enough with those proposed by M. C. K. to satisfy the latter, but at a number of points it is believed that Fellowcraft's strict reasoning from premises is inapplicable, through the failure of the premises. These points can more conveniently be taken up in a separate article, which is to follow.

Fellowcraft's Second Letter on Shock Values

My Dear M. C. K.,

Nearly every problem in mechanics is open to several lines of attack for its solution: and for example, a particular problem might be correctly solved, with respect to the forces involved, or in terms of impulse or momentum, or likewise, in terms of energy or work.

The writer in criticising your figures relative to the necessary horizontal and vertical action of a spring, unfortunately chose to follow your line of attack in obtaining the solution in terms of work. The writer's mental picture of the results of impact with the obstacle encountered is clearly a picture of *force*, and it was due to the lack of mental agility, in forgetting the picture of force while solving in terms of work, that the error of compounding work values occurred.

The figures 1,975 and 3,180 foot-pounds, representing respectively the horizontal and vertical work values, is undoubtedly wrong, but the writer will attempt to show that the value of the ratio 1,975 : 3,180 when considered as the ratio of the horizontal to vertical shock, is still correct.

Since the stressing of the vehicle materials, the elements that make for destruction, and the bearing pressures, etc., are measured in terms of force, the problem will first be solved in consideration of the forces involved.

In Terms of Force

The kinetic energy of the car, due to its mass and velocity, is capable of being transformed into force only by the introduction of a resisting force. Referring to Fig. 1, when the obstacle A is encountered, a force, or more properly a reaction, is induced in the direction AB, making an angle α with the plane of N B or the direction of the kinetic energy of the car.

In the force triangle AHB, if AB represents the reaction in magnitude, AH and HB are respectively its horizontal and vertical components, and since action and reaction are equal, A'B of the force triangle A'H'B, is equal in magnitude to A B, also A'H' and H'B are respectively equal to AH and HB.

The maximum possible value of the reaction AB is unlimited, since it is supplied by the earth, but the value of the acting force A'B, is determined by the possible values of its components A'H' and H'B, and these in turn must bear a relationship to each other, that is a function of the angle α. It is evident then, that in order to check the momentum of the car, forces must be applied in the direction of A'H' and H'B and these forces must be in the relationship of $A'H' = H'B \cot \alpha$.

The force A'H' is supplied through the kinetic energy of the car, and its maximum possible value is easily determined.

$$\text{K. E.} = \frac{3{,}000 \times 50^2}{64} = 117{,}187 \text{ foot-pounds.}$$

$$\text{Space} = \frac{10.53}{12} \text{ feet.}$$

$$\text{K. E.} \div \text{Space} = \text{average of the force} = 117{,}187 \div \frac{10.53}{12} \cdot = 122{,}000 \text{ pounds.}$$

Therefore the maximum possible mean value of A'H' = 122,000 pounds.

The force H'B is supplied by the inertia of the mass of the platform supported at B.

The static mass supported at B is known to be $\frac{1{,}000}{32}$.

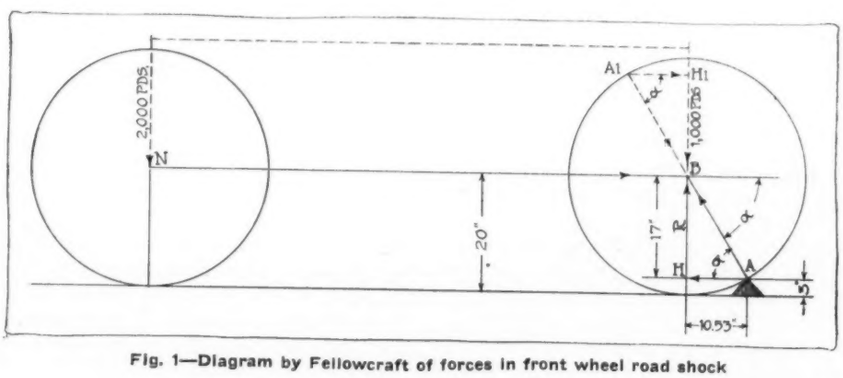


Fig. 1—Diagram by Fellowcraft of forces in front wheel road shock

The lineal velocity of the car is 50 feet per sec. = 600 inches per sec.

The time, t, required to mount the obstacle $= \frac{10.53}{600}$ sec. = .01755 sec.

If R denotes the mean vertical force in pounds, $R = ma$. where $m = \frac{1,000}{32}$ and a = the mean vertical acceleration = space $\div 2t^2$

$$a = \frac{3}{2 \times 12 \times (.01755)^2} = \frac{.125}{.000308} = 405.5 \text{ ft. per sec. per sec.}$$

$R = \frac{1,000 \times 405.5}{32} = 12,676$ pounds. The maximum mean value of H'B is therefore 12,676 pounds, under the condition that the value of R was zero just previous to the impact.

Since the maximum possible value of A'H' is 122,000 lbs. and that of H'B is only 12,676 lbs., it is evident that the limiting value of A'B must be determined by the component H'B, and may be expressed by $A'B = \frac{H'B}{\sin a}$. The limiting value of A'H' is therefore H'B cot $a = 12,676 \times \frac{10.53}{17}$ = 7,875 pounds.

The ratio of the horizontal to vertical shock is expressed by the ratio 7,875 : 12,676 or 1 : 1.61.

The value of this ratio is less than unity for all values of a greater than 45 degrees, and is greater than unity for all values of a less than 45 degrees.

Figuring with Momentum

The problem might be solved in terms of impulse, since the time element T is the same for the action of both forces, and since terms of momentum or impulse may be compounded as are pure forces. It will be noted however that, since the time element is common to both forces, horizontal impulse : vertical impulse = horizontal force : vertical force = 1 : 1.61.

It does not appear to the writer that the solution can be successfully made in terms of work, since work is independent of time, and it is the time element that is all important where stresses of materials occur under impulsive loads.

The Work Values

A comparison of the work values may be interesting, however. The horizontal force acts through a space of $\frac{10.53}{12}$ feet, and the work done is $7,875 \times \frac{10.53}{12} \times 1$ ft. lb. = 6,925 foot-pounds. The vertical force of 12,676 pounds acts through a space of $\frac{3}{12}$ feet, and the work done is $12,676 \times \frac{3}{12} \times 1$ ft. lb. = 3,170 foot-pounds. The ratio of horizontal to vertical work done is 6,925 : 3,170 or 2.18 : 1 but the respective spaces covered in doing the work are in the ratio of 10.53" : 3" and the space-average of the forces is in the ratio of 1 : 1.61.

It was seen that the vertical work performed in mounting the obstacle amounted to 3,170 foot-pounds. Now consider a car whose weight upon the front axle is 12,676 pounds, and assume the car to be raised by a jack to the height of 3 inches. The work in so doing is $12,676 \times \frac{3}{12} \times 1$ ft. lb. = 3,170 foot-pounds.

The work done in both cases is the same, but while in the first case, with a front axle load of 1,000 pounds, a shock force of 12,676 pounds was developed, in the second case, with an axle load of 12,676 pounds, the shock force would practically be nil.

Is it fair then to draw conclusions regarding the practicability of springs in terms of work, when all the factors that make springs necessary are measured in terms of force?

An interesting comparison of horizontal force, space and work to vertical force, space and work, through all values of a from 80 degrees to 10 degrees, is shown in Fig. 2, where the

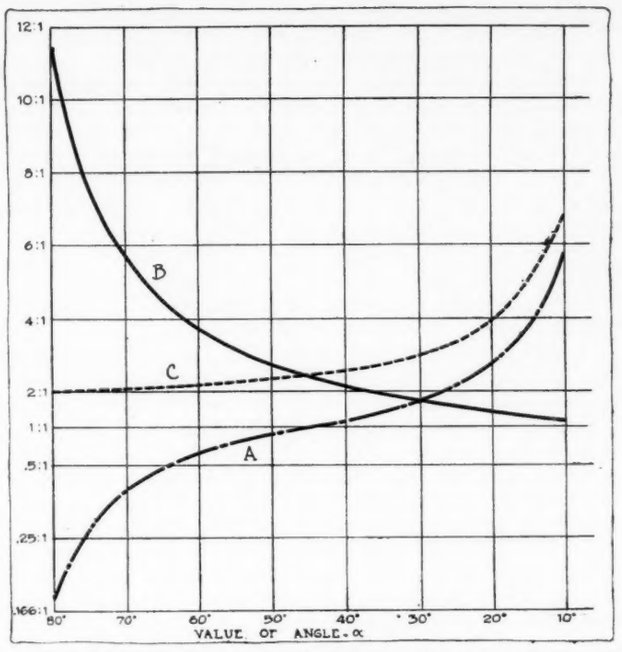


Fig. 2.—Diagram showing relations of essential factors at different angles of impact, according to Fellowcraft

Curve A shows ratio of horizontal to vertical force; plotted from AH = R cot a or AH: R = R cot a : R = cot a : 1

Curve B shows ratio of horizontal space to height raised; plotted from the ratio of horizontal to vertical space = cos a : versin a

Curve C shows ratio of horizontal to vertical work performed. It is the product of curves A and B, since curve A represents force and curve B the space through which it acts

curve A is the ratio of horizontal to vertical force, B the ratio of horizontal to vertical space, or the space traversed to the height raised, and C the ratio of horizontal to vertical work performed. Considering the values of a from 80 degrees to 45 degrees, as these are about the limits of the values in which we are particularly interested, it will be noted that while the force ratio varies from .176 : 1 or 1 : 5.68, the work ratio varies only from 2 : 2.41 or 1 : 1.205, and the question of whether work is the proper consideration for spring comparison becomes more insistent.

A Point in Doubt

It is not just clear to the writer how the work values of the horizontal and vertical components of the shock force affect the spring action, but from experience it is commonly known that if a is large, as for example 80 degrees, making the height of the obstacle 3/10 of an inch, very little shock effect is noticeable in mounting this small obstruction. Still, the horizontal to vertical work ratio for this angle is 2 : 1. In what form does this work appear? Surely not in shock, for the corresponding force ratio is .176 : 1 or 1 part horizontal force to 5.68 parts vertical force.

When the angle a is reduced to 45 degrees, making the obstacle height 5.85 inches, the force ratio will have increased to 1 part horizontal force : 1 part vertical force, an increase of 5.68 per cent. The work ratio for an angle of 45 degrees is 2.41 parts horizontal to 1 part vertical work or an increase of 20.5 per cent. It is likewise a matter of common knowledge that an obstacle of this height would produce severe shocks, that are apparently out of proportion to the small increase in the work value.

In my letter of March 10, suggesting the solution of the ratio of the horizontal to vertical shock forces in terms of the inertia of the mass of the platform supported by the front axle, and a function of the angle a, you suggest that in doing so, the weight of the vehicle is ignored. Just what you mean by the "whole vehicle weight" is not clear. The static

weight on the front axle is considered in figuring the vertical component or the value of R, while the kinetic energy of the car is considered in the horizontal component.

My solution does regard the kinetic energy as being potential and only capable of being transformed into force, as resisting force is applied. The application of the resistance is NOT in the plane of N B, but through the angle α. Then, as long as α has a value, the vertical component H'B has a value, and the force A'B is determined by the lesser of the limiting values of its components. If the momentum of the vehicle is sufficient to carry it over the obstacle the lesser component H'B must determine the values of A'B and A'H', and therefore that proportion of the total kinetic energy that may be transformed into horizontal force.

If the momentum of the vehicle is not sufficient to carry it over the obstacle, the component A'H' will determine the limiting value of A' B and H' B, and the vehicle will mount the obstacle to the point where the impulse of A H equals M V or the momentum of the car.

The components H'B and A'H' are therefore, two forces : one determined by the vehicle speed and the front axle load, and the other by some proportion of the kinetic energy of the car, being transformed into force : the proportion being such, that its force value when added geometrically to the first force, will produce a resultant acting in a plane passed through the wheel center and the point of impact.

The writer fails to see where any other element of "weight" enters into the problem.

In conclusion, the writer wishes to call your attention to a feature in your reasoning relative to Fig. 6 that may help to clear the atmosphere concerning the points in question.

If BA, whose value you show to be $\frac{10\,53}{27.53} \times$ K. E., represents the energy spent in shaking the earth, it automatically admits of a force acting in the direction BA. The earth would, of course provide a reaction for this force. But BA, by your premise, is only one of the two components of the force whose direction is N B.

A FORCE CANNOT ACT ALONE: NEITHER CAN ONE OF ITS COMPONENTS ACT ALONE.

If there be a component acting in the direction of B A, there must also be a component acting in the direction B L. There being no resistance in the direction L B, the component whose direction is B L cannot act. Therefore the component whose direction is B A cannot act.

The force then which DOES act in the direction B A, is not a COMPONENT of the force whose direction is N B, but is a force WHOSE COMPONENTS act in the directions N B and B H.

A H and H B are thus shown to be components of the SAME force, and regardless of their origin, must combine in such proportions as to produce the resultant A B, and therefore must bear a fixed relationship to each other that is a function of the angle α.

This reasoning reduces the problem to the same solution given earlier in this letter. Is it not correct?

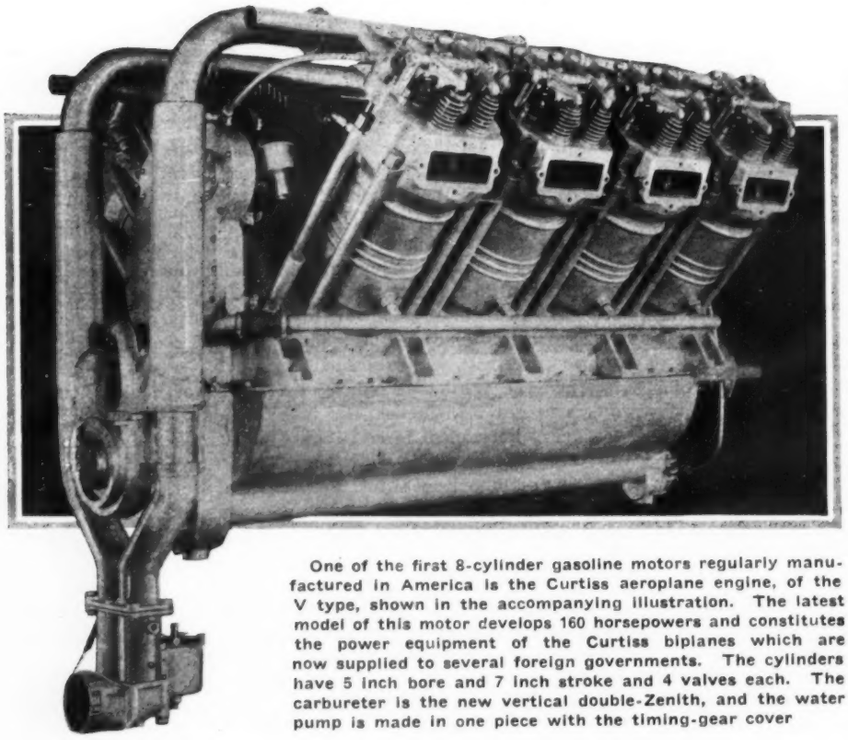
March 29, 1915. A. FELLOWCRAFT.

Back to the Main Subject

The practical importance of the question whether or not the relative magnitude of the horizontal component of road shocks is such as to call for special construction, in order to temper the effects of this component for motor vehicles in general and those operated with solid tires in particular, fully justifies the unabridged rendering of Fellowcraft's method for determining the shock values by an uncompromising application of the laws of physical science and a strict insistence on the scholastic use of its ideology. "Is it not correct?" he asks in conclusion. The writer would say here, in advance of a more complete reply, that in his opinion Fellowcraft's method requires to be supplemented by a closer consideration of actual shock conditions before it can become applicable and convincing. As it stands, it ignores the nature of the movement of the axle, by which the force values are strongly concentrated in the first portion of the shock space and which is one of the factors that made the writer prefer to try a short cut to applicable results. Fellowcraft's solution would apply with equal right to a shock from an obstacle affording gradual ascent of the wheel—the difference would be quantitative only and for this reason alone it does not seem to present a useful parallel for practical conditions until supplemented and modified. The writer did not wish to subordinate the practical interest to the convenience of a strict and final mathematical solution obtained by the sacrifice of facts in the situation. The correct vision of the problem must precede a "correct" solution.

As a discussion which drifts toward a slighting of the main practical question at issue and emphasis on the personal question of "property in truth" becomes lengthy and unsuited for publication, M. C. K. will leave points of this nature for the readers to decide and, while profiting by Fellowcraft's methods where they seem applicable, will take up the subject in his final reply strictly with reference to its practical bearings. The question can be put in this way: Are the high work values of horizontal components likely to be represented in high values of force and destruction, in practice?

Curtiss 8-Cylinder Aeroplane Motor



One of the first 8-cylinder gasoline motors regularly manufactured in America is the Curtiss aeroplane engine, of the V type, shown in the accompanying illustration. The latest model of this motor develops 160 horsepowers and constitutes the power equipment of the Curtiss biplanes which are now supplied to several foreign governments. The cylinders have 5 inch bore and 7 inch stroke and 4 valves each. The carbureter is the new vertical double-Zenith, and the water pump is made in one piece with the timing-gear cover

37,990 Michigan Licenses in 2 Months

More Than Number of Registrations for Entire Year of 1912—Complete Statistics of Makes Registered

By Marc Braun

DETROIT, MICH., April 3—There were 37,990 automobiles and trucks registered in Michigan during January and February, 1915, exclusive of licenses taken out by Canadians, automobile manufacturers and dealers. Total registration for the entire year 1912 was only 39,579 including these clases.

Of the total number registered in the first 2 months of this year 36,443 were gasoline cars and 1,494 were electrics. There were 36,420 passenger cars, 1,389 being electrics, while of the 1,547 commercial vehicles 105 were electric machines. These cars are the products of 297 manufacturers only nine of whom are European. The 288 American makes include many cars which are no longer built. The 483 passenger cars classed as miscellaneous include a large number of assembled, home-made and special types.

Ford registrations in January and February totaled 13,917 or 27.1 per cent. of the total registration. Buick has 2,211, Overland 1,852, Studebaker 1,768, Cadillac 1,594 and Reo 1,540. Of the electric passenger cars Detroit has 555, Rauch & Lang 143, Grinnell 123, and Baker 101. In the gasoline truck class the General Motors vehicles lead with 200, followed by Federal 185, Universal 120 and I. H. C. 121, while Detroit has 51 and Baker 22 among the commercial electrics. It should be noted that in the compilation of licenses no distinction is made between a passenger car and a commercial vehicle, all Ford, Overland, Studebaker, Buick, etc., cars being listed as passenger machines. Often where a license was issued to a business house the car was considered a commercial vehicle.

The statistics appearing in the tables herewith do not constitute a definite criterion as to the actual total number of cars of the various makes in operation in Michigan. These are only the registrations during the first 2 months of the year and names which are credited with only a few cars at this time may be among those at the head of the list when the total registration records are compiled.

It must be remembered that at this time of the year there are a great many owners who have not yet taken their cars out of storage and hence have not registered. Of course, some types of cars are more likely to be found in operation than others during the winter months, while those in the northern part of the state are more probable to be late in registering than those in the southern section.

Michigan Car and Truck Registration for January and February, 1915

All Passenger and commercial cars	37,990
All gasoline passenger cars	35,055
All electric vehicles	1,494
American makes of all cars	288
Foreign makes of all cars	9
Makes of passenger gasoline cars	189
Makes of passenger electric vehicles	21
Makes of gasoline commercial vehicles	71
Makes of electric commercial vehicles	7
American passenger cars	35,031
Foreign passenger cars	23
Electric passenger vehicles	1,389
Commercial gasoline vehicles	1,442
Commercial electric vehicles	105
Manufacturers' licenses	122
Dealers' licenses	221
Manufacturers' and dealers' licenses	2
Total all licenses issued	38,335

Registration of Cars and Trucks in Michigan During January and February, 1915

Gasoline Passenger Cars

Abbott	210	Marion	17	Elmore	41
American	63	Marmon	15	Elkhart	9
Apperson	23	Matheson	4		
Allen	4	Miller	20	Ford	13,917
Amplex	4	Moline	5	Franklin	79
Austin	8	Mercer	10	Fuller Buggy	2
Anhut	8	Marquette	17		
Alter	11	Mason	4	Grant	70
Aerocar	4	Marathon	9	Gaylord	3
Auburn	61	Moon	7	Great Western	2
Alpena	14	Monarch	25	Glide	10
		*Michigan Buggy	63		
Buick	2211	Metz	68	Haynes	56
Brush	94	*Michigan Motor	46	Hupmobile	769
Briggs-Detroiter	162	Metzger	68	Hudson	722
Blomstrom	5	Mt. Pleasant	1	Herreshoff	63
Briscoe	29	Marvel	1	Halladay	12
Badger	1	*Michigan Auto	6	Henderson	8
Baines	1	Monroe	5	Herff-Brooks	2
Benham	2	*Motor Car	3	Havers	25
Brownell	1	Meteor	1	Henry	13
		McIntyre	4	Holsman	1
Cadillac	1594	Mora	1	Homer	1
Chalmers	574	McFarland	1	Huron	2
Cartercar	396	Midland	1		
Columbia	16			Imperial	180
Courier	11	National	20	Interstate	9
Chandler	42	Northern	8		
Cutting	94	Norwalk	1	Jackson	349
Cole	149	Northway	1	Jeffery	106
Chevrolet	216	Northwestern	1		
Cunningham	11	Nicholds	1	King	151
Crow	35			Krit	394
Case	19	Oldsmobile	397	Kisselkar	71
Clark	11	Oakland	738	Keeton	5
Crescent	5	Overland	1852	Kron	1
Carnation	4	Owen	9		
Carhart	12	Orion	1	Lozier	138
Colby	1	Orient	1	Little	66
Cleveland	2			Lambert	26
Consolidated	1	Packard	432	Lion	39
Corbin	1	Paige	645	L-P-C	1
Cooley	1	Paterson	164	Locomobile	35
Campbell	1	Peerless	68	Lexington-Howard	1
Cameron	1	Pierce-Arrow	99		
		Premier	8	Maxwell	822
Dodge	48	Pilot	3	Mitchell-Lewis	209
Detroit-Dearborn	5	Pratt	1		
Davis	4	Pioneer	1		
Day	1	Pilgrim	1		
Deal	3	Parry	2		
Deere	1	Partin	2		
DeTamble	6	Pullman	1		
Diamond-T	1	Palmer-Singer	1		
		Princess	1		
E-M-F	234	Puritan	1		
Everitt	44	*Pope	46		
Empire	24				

Reo	1540	Borland	1
R-C-H	217	Broc	8
Regal	285	Baker	101
Rainier	6	Colonial	1
Royal	2	Columbus Buggy	26
Read	11	Century	72
Remington	1	Church-Field	30
Rider-Lewis	1	Detroit Electric	555
		Fuller	3
Studebaker	1768		
Saxon	163	Total	1,389
Stevens-Duryea	42		
Stoddard-Dayton	51	**Commercial Gasoline Cars**	
Suburban	8		
Stearns	5	Republic	54
Speedwell	9	Autocar	10
Scripps-Booth	24	Sampson	31
Stutz	10	Alco	1
Schacht	9	Aetna	1
Stanley	9	Best	2
Staver	1	Beyster	2
Sultan	1	Commerce	82
Simplex	4	Chase	25
Sterling	1	Cass	10
Selden	6	Commercial	3
		Dayton	24
Thomas	30	Duplex	3
Templeton	1	Decatur	1
		Dudley	1
Vulcan	2	Denby	2
Velie	15	Flint Wagon	23
Valley	7	Federal	185
		Four Wheel Drive	1
Warren	216	G M C	200
White	47	Grabowsky	39
Welch	34	Gramm	11
Wayne	15	Grand Rapids	3
Westcott	16	Gaeth	1
Wahl	4	Garford	7
Wolverine	1	Horner	26
Winton	180	Hewitt	1
		Saurer	9
Zimmerman	1	I. H. C.	101
Miscl.	483	Kelly	31
		Koehler	2
Total American passenger cars	35,031	Knox	5
		Kermath	5
		Lauth-Juergens	2
		Lippard-Stewart	2
		Little Giant	14
		Mais	1

Hupp-Yeats	45		
Eagle	1		
Ohio	40		
Phipps-Grinnell	4		
Rauch & Lang	143		
Rex	3		
Woods	88		
Walker	15		
Total	1,389		

Commercial Gasoline Cars

Republic	54	Mogul	2
Autocar	10	Menominee	10
Sampson	31	Mack	2
Alco	1	Motor Wagon	1
Aetna	1	O. K.	3
Best	2	Oliver	8
Beyster	2	Packard	98
Commerce	82	Pierce-Arrow	17
Chase	25	Peerless	20
Cass	10	Parcel Post	8
Commercial	3	Poss	20
Dayton	24	Pull More	1
Duplex	3	Standard	42
Decatur	1	Sternberg	1
Dudley	1	Stegeman	1
Denby	2	Seitz	9
Flint Wagon	23	Signal	18
Federal	185	Star	24
Four Wheel Drive	1	Selden	3
G M C	200	Superior	1
Grabowsky	39	Randolph	1
Gramm	11	Rapid	21
Grand Rapids	3	Reliance	8
Gaeth	1	Reo	12
Garford	7	Universal	120
Horner	26	United	4
Hewitt	1	*U. S. Motor	9
Saurer	9	U. S. Truck	5
I. H. C.	101	Vim	3
Kelly	31	Van Dyck	2
Koehler	2	Vulcan	1
Knox	5	Wagenhals	9
Kermath	5	White	19
Lauth-Juergens	2	Misc.	18
Lippard-Stewart	2		
Little Giant	14	Total	1,442
Mais	1		

Foreign Gasoline Cars

Benz	4	Mercedes	1
Daimler	1	Napier	1
Darracq	2	Renault	9
Fiat	3	Rolls-Royce	1
Hispano-Suisa	1		
		Total	23

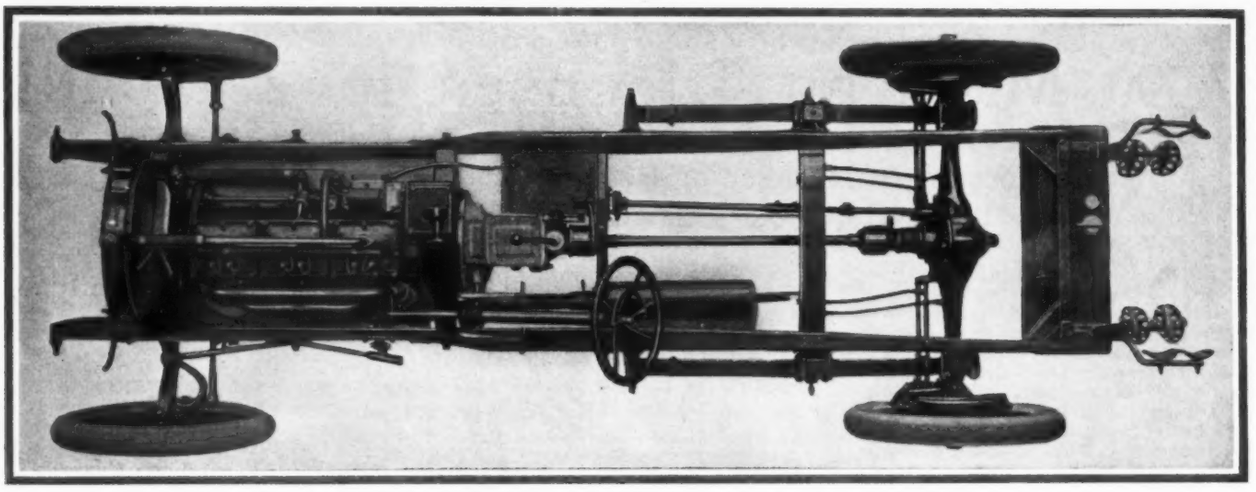
Electric Passenger Cars

Argo	33	Flanders	88
Babcock	9	Grinnell	123

Electric Commercial Vehicles

Baker	22	Electric Vehicle	3
Champion	3	G. V.	15
Couple Gear	7	Walker	1
Detroit Electric	51		
M & P	3	Total	105

NOTE—Impossible to tell from registrations maker of various machines, cars of this name having been made by several concerns.



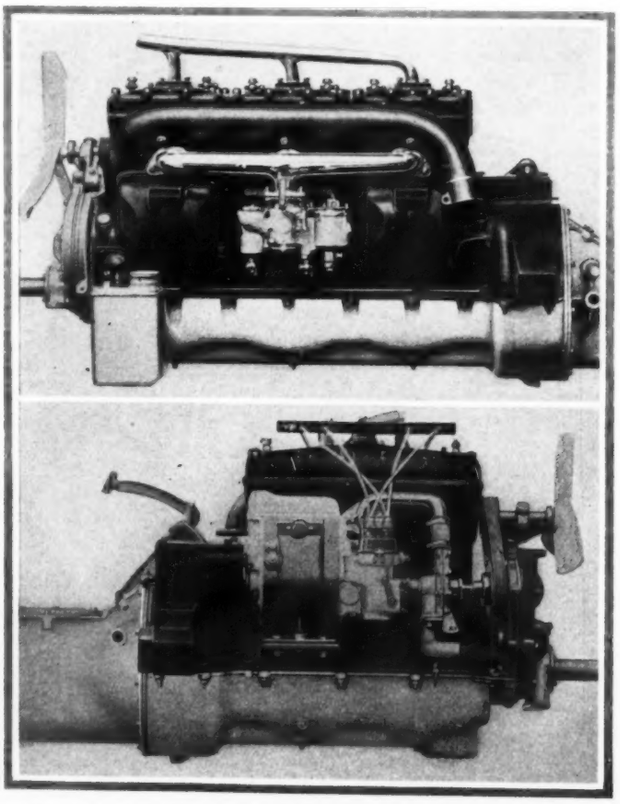
Plan view of chassis of six-cylinder, seven-passenger 50-horsepower Westcott

Comfort Is Feature of New Westcotts

Six and Four Chassis of Clean Design Take Four Body Types—Neat and Convenient Control

IN producing the two new chassis the engineer of the Westcott Motor Car Co., Richmond, Ind., has obviously given his close attention to a study of detail, so that the well known components used are given every opportunity to display their qualities. While the general lines of the six and four-cylinder chassis are similar, there are some points of difference, the most noticeable being that the six has a cantilever rear suspension while the four has three-quarter elliptic springs. The axles are different also, since a Weston-Mott is used on the four and a Timken on the six, the latter having spiral bevels and the former straight tooth gearing. Another difference appears in the transmission as the four has a single universal behind the gearset while the six has an open propeller shaft with two joints. In both cars the torque and drive are taken by the springs.

The motors are both standard Northways, the cylinder dimensions being 3 1-2 by 5 inches in each case, giving a displacement volume of 192 cubic inches for the four and 288 cubic inches for the six. Cylinders are block cast and have divided detachable heads which cover a pair of cylinders each on the six, but the head on the four is one piece.



Westcott-Northway power plants. Upper—Carbureter side of six. Lower—Generator side of four

A neat feature of the Northway construction is the combination of the breather orifice with the valve-inclosing plates, there being a slot which is covered by a bead cast in the cover, this bead serving to provide something by which to hold the cover when taking it off. This can be seen clearly in the side view of the six, and the other photograph of the four-cylinder motor shows the mounting of the Delco single unit starter and generator. It will be seen that this is driven through the water pump, and just in front of the fan belt is a little platform designed to carry a tire pump, supplied on the six but listed as an extra on the four.

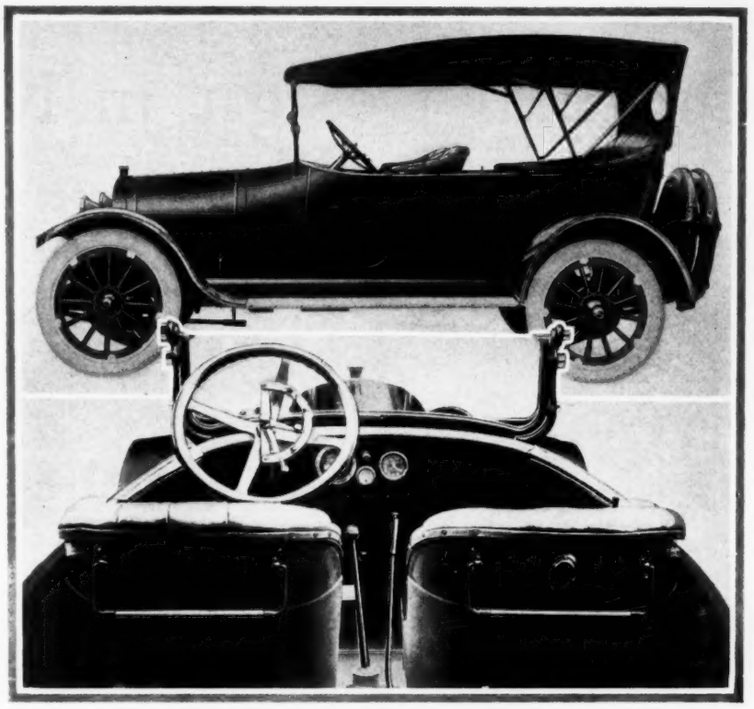
Owing to the use of the Stewart vacuum feed on both cars the carbureters can be mounted high and their accessibility is very great; they are not the same for the two cars as the six has a Rayfield and the four a Schebler. An air lever is supplied and attached to the steering post, while the high placing of the carbureters makes the accelerator connections very straight and simple. One of the little details that so greatly make for the driver's comfort is the throttle pedal which is shown in the sketch, the aluminum block making a convenient foot rest whence the plunger can be depressed

or raised by a slight twist of the ankle. On the steering wheel there are the usual throttle and spark levers, while the horn button is located centrally in the wheel boss.

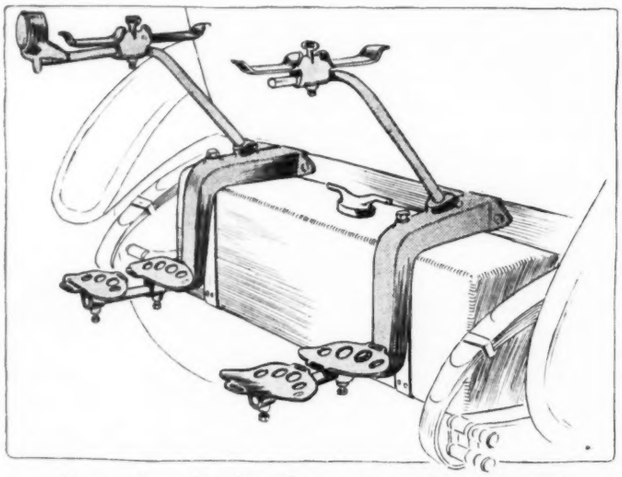
The leather-faced cone clutch is, of course, inclosed completely by the bell housing which connects to the three-speed gearbox, and the pedal is provided with a setting or adjustment, so that its altitude in the normal position can be made to suit the person who habitually drives the car. This is a petty refinement which ought to be part of every automobile, as it makes all the difference in the world to anyone with a little over or under the average length of leg.

Among other special details the most important are a hand adjustment for the external service brakes, and a particularly rigid and strong spare tire carrier. The brake adjustment is in the correct place; that is, on the last rod and close to the brake band itself. It consists of a large thumb screw which is easy to turn and can be reached by putting the hand through the rear wheel between a couple of spokes. Both brakes may be taken up in a couple of minutes.

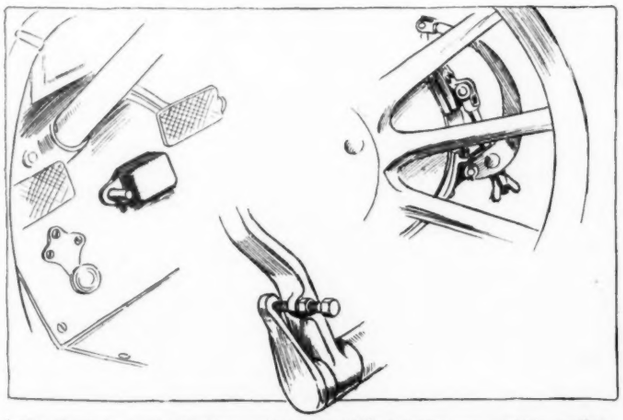
The tire carrier combines the purpose of supporting the two demountable spares with a rigidity that eliminates any chance of shaking, and of holding the gasoline tank. How this is done is best seen by reference to the sketch, and it may be added that it is possible to jump up and down on the carrier without causing the least deflection.



Upper—Side view of model 0-35 four-cylinder, 35-horsepower Westcott. Lower—Interior of six-cylinder Westcott showing aisle between front seats



Strong channel-section tire carrier and tank support



Left—Pad for accelerator. Center—Adjustment on clutch pedal. Right—Simple adjustment of service brake bands

There is an indefinable something about the body lines that suggests comfort, and the idea thus given is perfectly correct, as care has been taken to provide ample depth of cushion, which is the most important thing in car comfort. For the driver and front passenger there are separate seats with a narrow passage between them and this gives the driver as much freedom for his right arm as for the left. The height of the seat back beneath the driver's right armpit is just equal to that of the padded edge of the body on his left, which means that both arms rest naturally in the same position and this is an appreciable aid to comfort.

Roadster Bodies Also Made

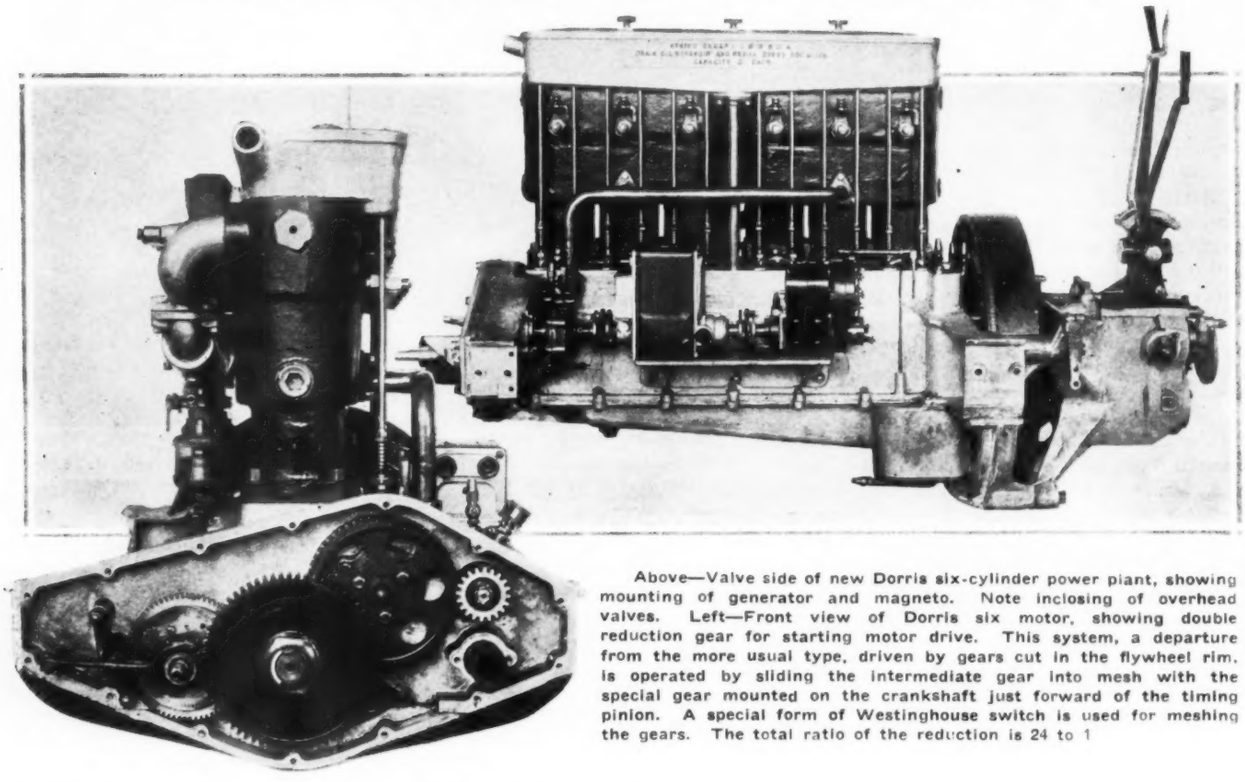
On the four there is plenty of room in the tonneau for three people and the front seats are undercut to provide space for the passengers' feet when they are reclining on the deep back cushion. In the six, folding seats are located behind the divided front seating and the tonneau is longer, so giving room for seven passengers altogether. Roadster bodies with three seats are made for both chassis and the center seat is a little set back in the modern style. The four cylinder is also obtainable in speedster form with a racing body.

Turning to the statistical details, the wheelbase is 113 inches on the four and 125 inches on the six, tires are 33 by 4 and 34 by 4 respectively and Firestones are the usual equipment. Two different top speed gear ratios are given, 3.75 to 1 and 4 to 1, according to the district in which the car is sold.

An ingenious little Delco fitting used on the Westcott is a buzzer that gives warning at once should a short circuit occur anywhere in the lamp circuits. This is inclosed within the cowl and gives out a loud rapping noise directly the discharge along any line rises above what it ought to be for the proper supply of the lamp. It is also very useful as a warning when the lamp lead is temporarily disconnected for any reason, since it sounds immediately if the end of the wire carrying the lamp connection should accidentally fall against the frame or any metal part of the chassis.

Original Design in New Dorris Six

Valves Removable with Seatings as Cages Screw Into Cylinder Head—Ingeniously Oiled—Seven-Bearing Crankshaft



Above—Valve side of new Dorris six-cylinder power plant, showing mounting of generator and magneto. Note inclosing of overhead valves. Left—Front view of Dorris six motor, showing double reduction gear for starting motor drive. This system, a departure from the more usual type, driven by gears cut in the flywheel rim, is operated by sliding the intermediate gear into mesh with the special gear mounted on the crankshaft just forward of the timing pinion. A special form of Westinghouse switch is used for meshing the gears. The total ratio of the reduction is 24 to 1

FOR many years past the Dorris Motor Car Co., St. Louis, Mo., has been making four-cylinder cars, using overhead valve motors of its own design and construction and applying a distinctive originality to the whole chassis. It has now added a six-cylinder model which embodies most of the recognized Dorris features, together with a variety of small refinements, and in this new car none of the originality of former designs has been sacrificed.

Valves Readily Removable

Unlike many overhead valve motors, the valves are readily removable complete with their seatings, as the cages are screwed into the cylinder head. The cylinder head is bored out to receive the cages and the latter make contact with the walls of their containing chambers, so that heat is transferred to the main casting and thence to the waterjacket. The use of cages of the correct thickness and the provision of adequately cooled walls in close proximity is an essential matter if an overhead valve motor is to be successful since the cages are liable to give trouble if allowed any opportunity to overheat, and this appears to have been taken care of most efficiently in the Dorris construction. Instead of an overhead camshaft, which might call for some intricacy of driving mechanism, the usual location is employed, the valves being operated by means of long push rods and short rocker arms, the latter mounted on a hollow shaft that lies along the top of the cylinder block. Adjustment for valve stem clearance is made on the push rods, and the detail appears in the end view of the motor. At the upper end of each push rod is a small cup, and the corresponding extremity of each rocker is cupped similarly, connection between the two parts being made by inserting a single steel ball of 5-8 inch diameter; this ought to be better than a yoke and pin coupling, because it compensates for wear automatically, needs less lubrication and facilitates the removal of a valve. This last feature is obvious from the drawing for it is only necessary to depress a valve by hand in order to free the push rod and allow the rocker to drop out of the way of the cage as this is unscrewed.

Features of Dorris Six

- Unit Power Plant
- Multiple Disk Dry Clutch
- Inclosed Overhead Valve
- Starting Motor Drive from Outside of Timing Case
- Wheelbase, 128 Inches
- 36 by 4½ Inch Tires
- Westinghouse Starting and Lighting

Valve Lubrication Ingenious

In lubricating the bearings of the rockers on the hollow shaft which carries them it is highly desirable to prevent pools of oil collecting around the tops of the valve cages because oil that gets down the valve stems in quantity is liable to produce quantities of carbon in awkward places. It is none the less necessary to see that the rockers are always free, since friction on their centers causes lag in the valve action and produces wear on every part of the valve operation. Oil is fed by the main gear

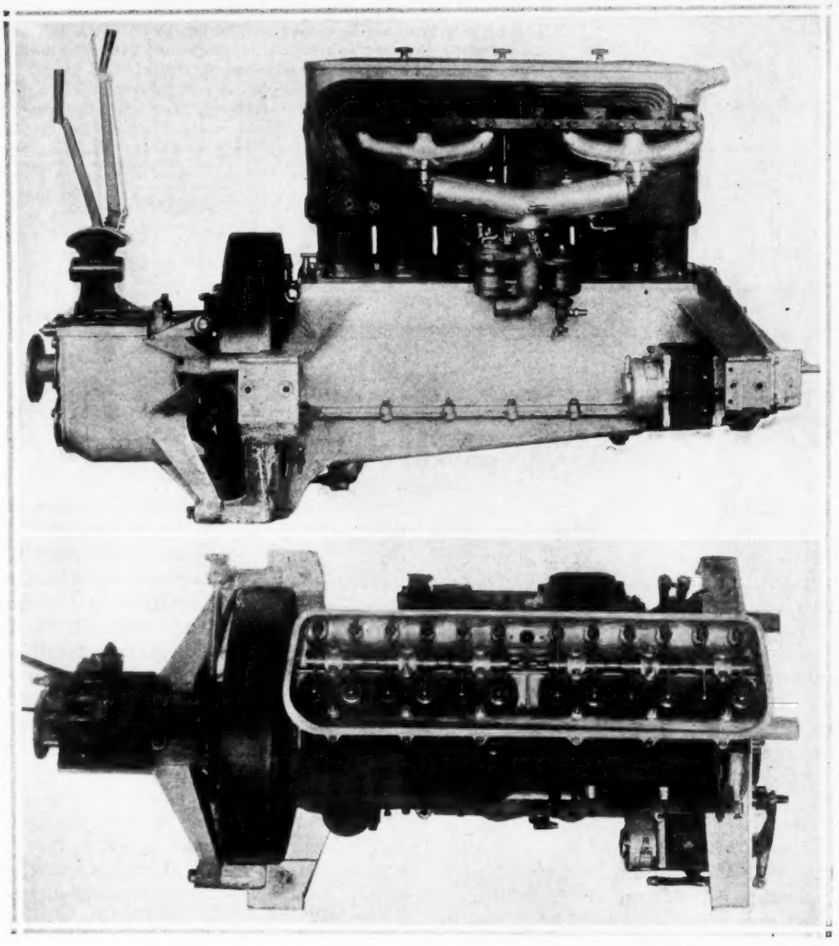
pump, through a copper pipe and so to the inside of the hollow rocker shaft, whence it exudes within each rocker bushing. To catch the overflow the aluminum top piece which incloses the rockers has a ridge raised on its bottom and the floor beneath the rockers is sloped so that all oil drains towards the center. Here, as is shown in the plan view of the motor, is situated the breather orifice, so surplus lubricant passes directly back to the crankcase.

It may also be seen in the illustrations how the water outlet pipe is cleverly combined with the aluminum top piece. It should be noticed that this outlet lies alongside the valve cages, thus insuring a free circulation at this most important part of the system.

Starter System Unusual

Instead of using the almost universal flywheel drive for the starting motor, the Dorris has a double reduction gear located in the timing case, giving a total ratio of twenty-four to one, and operated by sliding the intermediate compound gear into mesh with a special gear mounted on the crankshaft just forward of the timing pinion. This construction is, of course, neater than the flywheel drive in some ways and it ought to be a good deal less noisy in operation as the gears can be lubricated efficiently. To mesh the gears a special form of Westinghouse motor switch is used, the operation being mechanical. Pressing the starting pedal engages the contacts A and this causes current to pass through the motor and also through a resistance which absorbs most of the power. This means that the motor turns slowly and as soon as the plunger passes the vee edges A the current is cut off again, leaving the motor spinning gently. Continued pressure on the pedal has now brought the parts B B into contact and so pushes the starting gears into mesh, the slow turning of the motor making engagement easy, and the last stage of movement engages the main contacts and passes the full current into the motor. To prevent the motor being over-driven when the engine starts there is a roller clutch inside the large sliding gear and this, of course, overruns at the first explosion in the cylinders.

The Westinghouse generator is located on the opposite side of the engine and has a magneto in tandem, connection being made through a leather coupling at either end of the armature shaft.

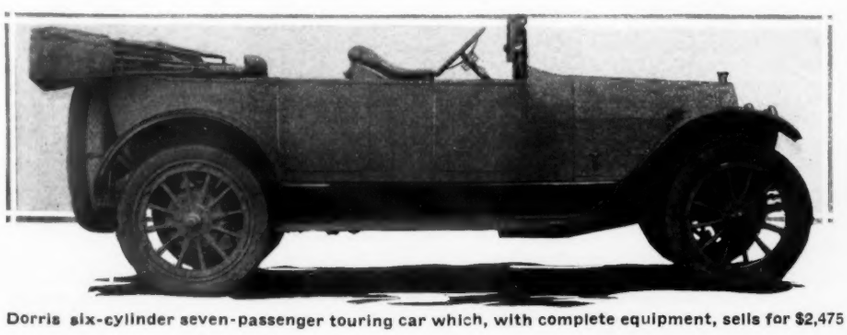


Above—Intake side of six-cylinder power plant of new Dorris, showing mounting of carbureter, intake and exhaust manifolds and starting motor

Lower—Plan view of Dorris six motor with overhead valve coverplate removed, showing rockers and oil draining arrangement

Seven-Bearing Crankshaft

Again contrary to usual practice, seven bearings are used for the crankshaft, this being thought to give the most rigid support possible, and it should be observed that room has been found for bearings of good width without making the motor excessively long for a 4 by 5-inch six.

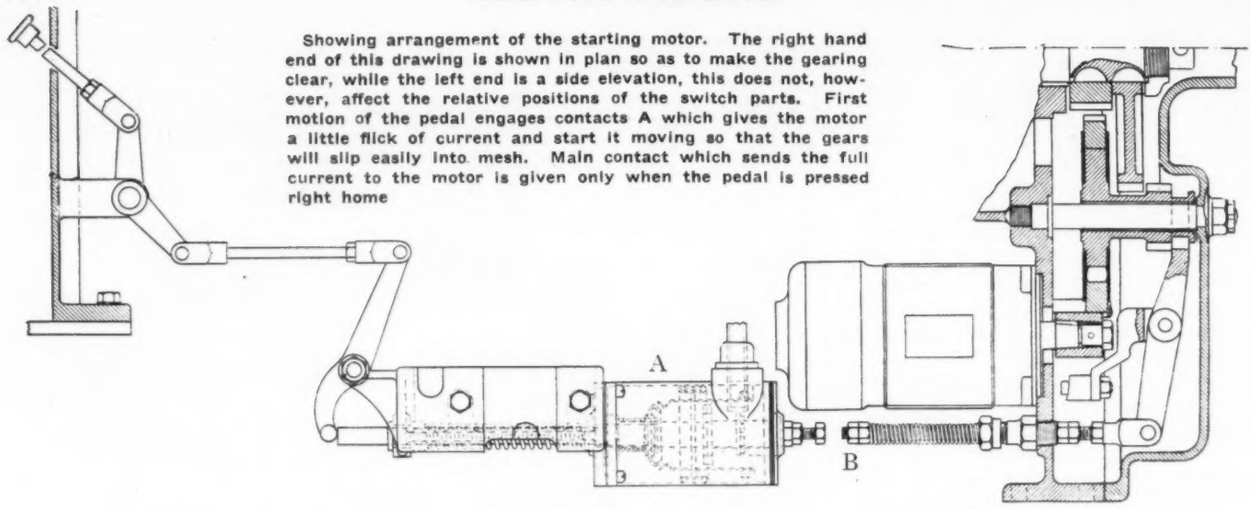


Dorris six-cylinder seven-passenger touring car which, with complete equipment, sells for $2,475

Both the intake and exhaust manifolds are rather different from standard ideas and it is to be observed that the gas is well warmed by an ample waterjacket round the main branch of the intake manifold. The carbureter fitted is a Stromberg, which is rendered very accessible by the absence of other fittings from that side of the motor.

In the illustration showing the magneto side of the motor the location of the oil pump can be seen, it being in the base and driven from the rear end of the camshaft. Lubrication for the crank and the other internal parts of the engine is by constant level splash, there being a gauge on the side of the crankcase and a drip indicator on the cowl board.

The motor is the most distinctive part of the Dorris chassis, but there are other parts that are also a little different from the normal. For instance, the clutch is a special design of dry multiple-disk and occupies the center of a fan flywheel, a form of draught inducer that is very uncommon on American chassis, though used a good deal in Europe. To



Showing arrangement of the starting motor. The right hand end of this drawing is shown in plan so as to make the gearing clear, while the left end is a side elevation, this does not, however, affect the relative positions of the switch parts. First motion of the pedal engages contacts A which gives the motor a little flick of current and start it moving so that the gears will slip easily into mesh. Main contact which sends the full current to the motor is given only when the pedal is pressed right home

allow this fan free action it is necessary to give an ample space for air escape around it, so the three-speed gearset is attached to the motor by arms instead of the more customary bell housing.

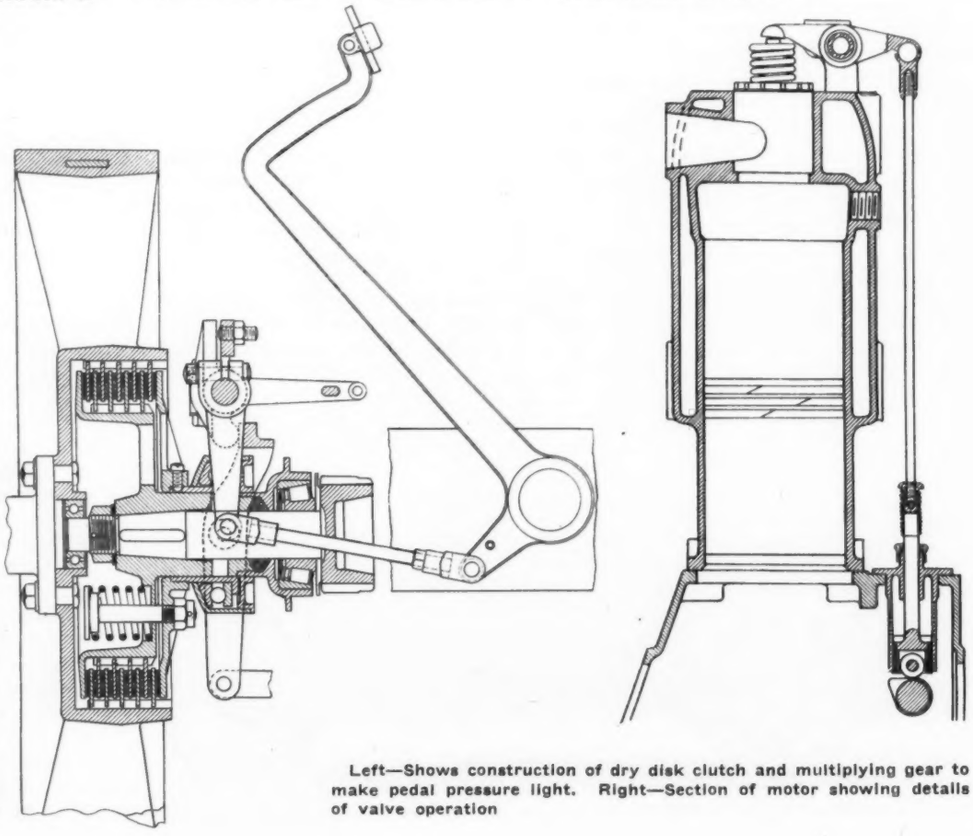
The unique feature of this car is a wrought iron bonding ring which is cast actually within the iron of the flywheel, just as copper lubricating pipes are sometimes cast inside the aluminum of the crankcase. The idea of this bonding is, of course, to assist the wheel to resist centrifugal stresses, since the fan construction is hardly so strong as the ordinary plain type of wheel. In the clutch drawing this bonding ring is shown in section, and another thing to be observed in the same illustration is the arrangemtnt of the levers operating the clutch. These are multiplying levers which greatly lessen the pressure needed to release the clutch and the desirable easy action is obtained with extremely few additional parts.

For the rear axle a Timken product is used with spiral bevel drive and the usual brakes, and there is nothing in the front axle or steering that calls for special comment. The Dorris company is among the few makers who still pin their faith to a platform rear spring, the side members being 50 inches long and the cross spring 40 inches; the front springs are, of course, half elliptic and also of good length.

Dash Is Part of Chassis

A peculiar little detail that seems to make for convenience is the use of a cylindrical gasoline tank located beneath the driver's footboard and attached to the side of the frame. This placing enables the filler and a gasoline gauge to be arranged so that they stand flush with the board; the gauge can be seen at any time by glancing downward, and the filler is accessible by merely opening the side door. A Stewart vacuum feed is employed for raising the fuel to the carbureter. Another important detail is that the dashboard is part of the chassis and carries all wiring, etc. The seven-passenger body simply drops in place over the dash and all switch gear is contained in a box clamped to the foot of the steering post. This is a very important detail of design that seems likely to become general practice. It is not, of course, unique on the Dorris, as several other automobiles have the same feature, but the other method is still so common that every manufacturer who adopts the improved system is deserving of congratulation. It is a manufacturing advantage to have the wiring all a part of the chassis, but the owner gains as well because the work of wiring up can be done better and more reliably when every portion of the electrical equipment is bare and readily accessible. That is to say the owner does not appreciate the scheme only when the body comes to be removed.

Body equipment is complete in all detail and includes a Golde one-man top, Stewart tire pump and 36 by 4 1-2-inch tires; the wheelbase is 128 inches with standard tread, and the price of the complete vehicle is $2,475.



Left—Shows construction of dry disk clutch and multiplying gear to make pedal pressure light. Right—Section of motor showing details of valve operation

Auto-Lite Doubles Factory Facilities

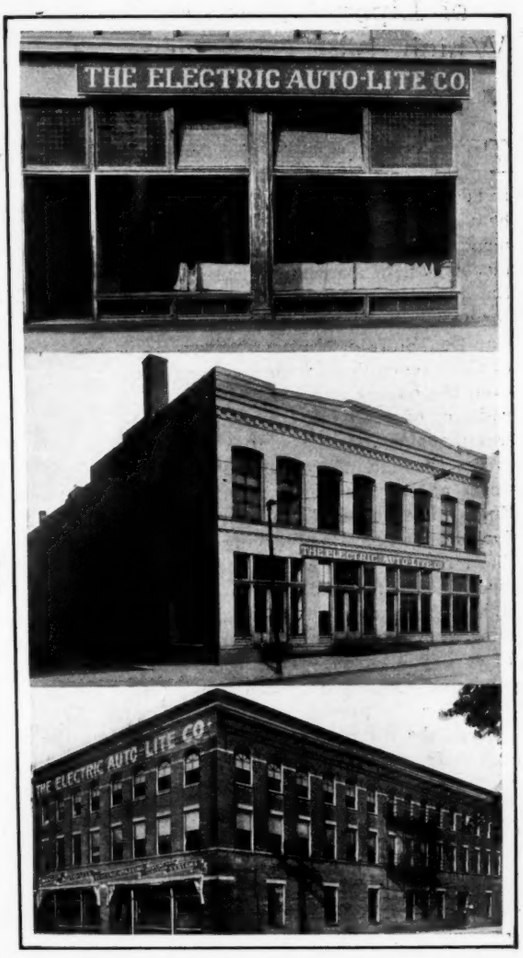
Two New Buildings Added—To Increase Output From 500 to 1,200 Accessories Per Day

TOLEDO, O., April 3—The Electric Auto-Lite Co., manufacturer of starting and lighting systems, lamps and horns, has taken over on a long-time lease two large buildings formerly occupied by the General Electric Co., which more than doubles its factory area. The larger of the buildings is 304 by 80 feet with a floorspace of 150,000 square feet, and four stories in height. The other is a three-story structure which will be used for offices, experimental and engineering departments, restaurant and rest rooms.

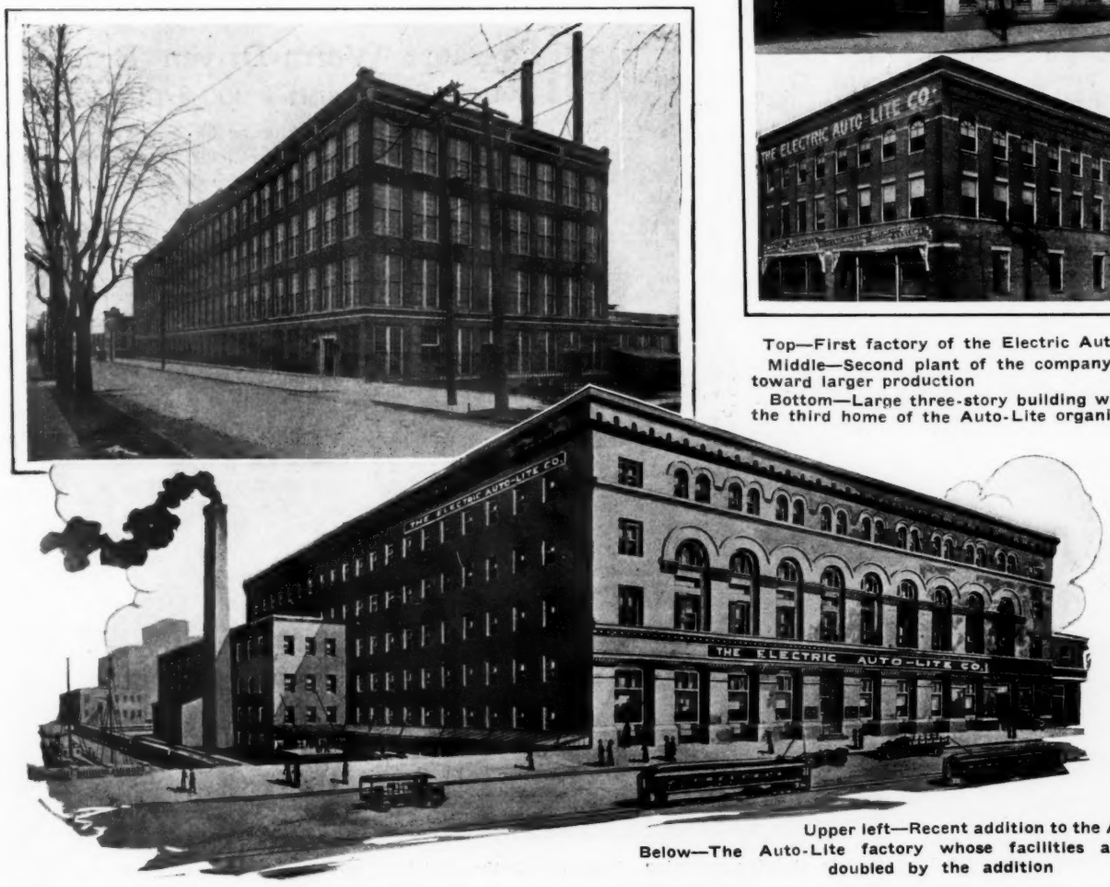
With the present factory, these structures aggregate 250,000 square feet of floorspace or about 6 1-2 acres. The larger of the two buildings will be used for manufacturing, some of the machinery already having been installed. The equipment will consist of automatic lathes, screw machines, grinders, milling machines, punch presses, etc.

The factory now employs 800 men, but this will be more than doubled when the new plant starts operation in the near future. The facilities provided by the additions, will enable the factory to increase its daily production from 500 to 1,200 complete outfits, consisting of lighting generators, starting motors, switches, lamps, horns and tire pumps. Orders are already booked for a large proportion of this production. The company has over fifty service stations throughout the country as well as branch offices and service stations in New York, Kansas City and San Francisco.

Officers of the company are: C. O. Miniger, president and general manager; Herman R. Saxon, vice-president and factory manager; C. S. Latting, secretary, and Walter Stewart, treasurer.



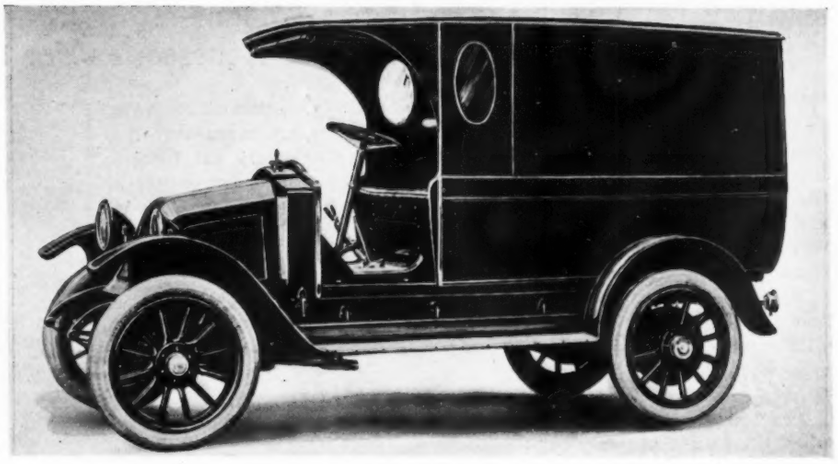
Top—First factory of the Electric Auto-Lite Co.
Middle—Second plant of the company, its first step toward larger production
Bottom—Large three-story building which comprised the third home of the Auto-Lite organization



Upper left—Recent addition to the Auto-Lite plant
Below—The Auto-Lite factory whose facilities are more than doubled by the addition

New Lippard-Stewart—Two Brockways

Electric Starting and Lighting Feature of Lippard-Stewart, Which, Like Brockways, Is Worm Driven



The new Lippard-Stewart 1-2-ton truck fitted with delivery-type body

THE Lippard-Stewart 1-2-tonner is the latest vehicle of this capacity to be brought out by a manufacturer of heavier sizes. The new truck supplements a line of 3-4, 1, 1 1-2 and 2-ton models, all of which are consistent in the plan of assembly. The manufacturer is the Lippard-Stewart Motor Car Co., Buffalo, N. Y. The vehicle is of the French type, with a sloping hood over the engine and a Renault type of radiator on the dash, the use of electric starting and lighting being a feature. The unit power plant drives through a single shaft to the Timken-David Brown worm axle. Wheelbase is 106 inches and treads standard. Engine is mounted on three points, the integral arms of the flywheel bell-housing serving also to support the gearbox. The motor is a 3 1-4 by 5 block with a detachable head and cored intake manifold. The valves are inclosed and on the right. Both exhaust manifold and carbureter are on this side, a short length of tubing providing hot air for the latter. The carbureter is a Zenith, controlled by both the hand and foot. No governor is fitted.

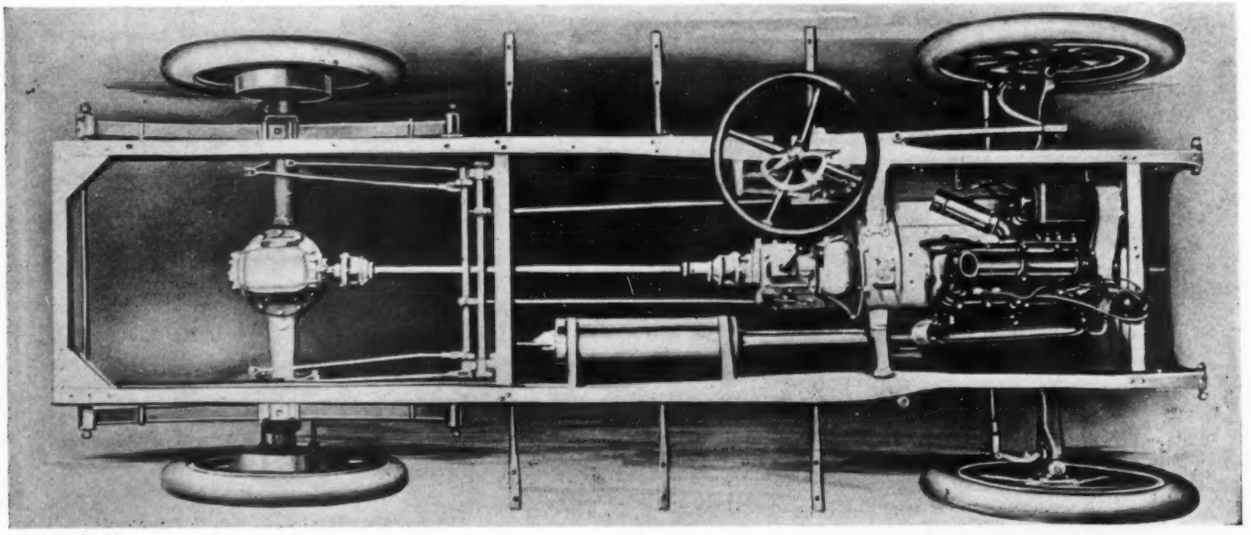
Ignition is provided by the Atwater Kent Unisparker system, the distributer being mounted over the timing gear case in front, and driven by helical gears. Circulating-splash lubrication is provided while cooling is by thermo-syphon.

From the leather-faced cone clutch the drive is taken by a three-speed gearset through Spicer joints and a single shaft to the worm-driven axle at a 6 to 1 reduction. The brakes are all on the wheel drums and are both internal, acting for the full width on the same drums, this being accomplished by the new Timken system, one set of shoes being in the vertical plane and the other horizontal. Drive and torque are taken by the half-elliptic springs.

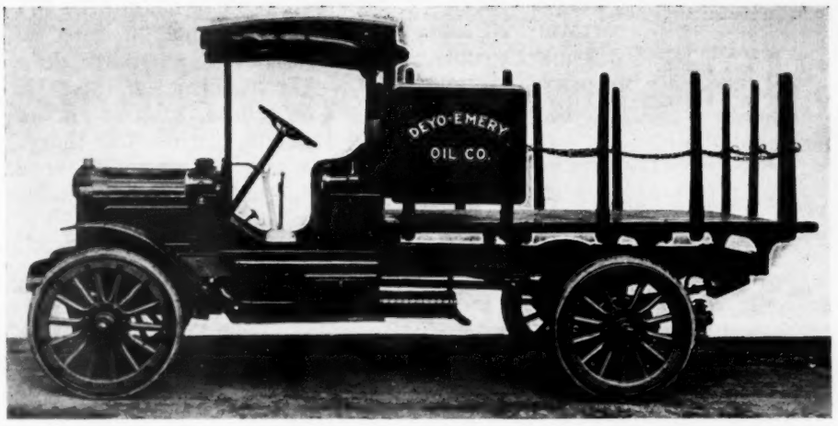
Tires are 33 by 4 all around, on demountable rims. The electric system consists of a motor-generator on the left side of the motor, driven from the crankshaft by an inclosed silent chain in front of the timing gear case. It operates at 12 volts. Chassis complete sells for $1,000.

Two More Worm-Driven Brockways, 2,500 and 4,000 Pounds

SINCE January, when the change in Brockway models from the air-cooled line with elliptic springs and wood frames was first announced, the Brockway Motor Truck Co., Cortland, N. Y., has introduced two more models in which the chain drive is superseded by worm. These models, however, do not replace the 1,500-, 2,500-, and 4,000-pound water-cooled chain-driven models, but constitute alternatives to



Plan view of Lippard-Stewart 1-2-ton chassis, showing mounting of electric starting and lighting system and worm-drive rear axle



The new 2,500-pound Brockway truck which uses worm drive and sells for $1,900

these types in 2,500 pounds and 4,000 pounds capacity.

Similar in all respects but the size and weight of parts affecting load capacity, the new models are chiefly characterized by their general conformance with the present trends in standard design. Their motors are no longer under French hoods, but are housed beneath rectangular hoods with cast-case finned-tube radiators. All springs are semi-elliptic, left steer and center control are employed, the motor, clutch and gearset are incorporated in one unit and drive is by a single shaft to the worm-driven axle.

They are built upon rolled channel steel frames, from which the motors are suspended directly from three points. Continental motors are used, cast in block, with centrifugal pump cooling assisted by both a radiator fan and a vaned flywheel. A Schebler carbureter and a Kramer governor are used on each of these motors, and a Bosch single magneto with fixed spark furnishes the ignition current.

Gear Reduction 8¾ to 1

From the motor the drive is taken by a dry-disk clutch and three-speed selective gearset of Brown-Lipe make, through a single shaft with two universals to the Sheldon rear axle. Torque and propulsion are taken by the springs on both models.

The motor of the 2,500-pound model is 3 3-4 by 5 1-4 inches. Maximum speed by governor is 15 miles per hour. This model has 124-inch wheelbase and uses 36 by 3 1-2-inch tires in front and 36 by 4 1-2 in the rear. It sells for $1,900.

On the 4,000-pounder the motor is 4 1-8 by 5 1-4. Wheelbase is 132 inches and tires are 36 by 4 front and 36 by 3 1-2 dual or option of 36 by 5 in the rear. The price of this vehicle is $2,200.

A One-Man, Pay-Enter Motor Bus Design

RESPONSIVE to the demand for motor buses, the Great Southern Automobile Co., Birmingham, Ala., has produced a special model of chassis and body for passenger service having a low floor with a pay-enter door arrangement for one-man operation. It has its motor under a conventional hood with drive by a bottom worm, the latter making the low floor possible with direct mechanical drive.

The chassis is rated at 2 1-4 tons capacity, and the complete vehicle is 22 feet long overall, 7 feet 6 inches wide at the eaves, 8 feet 9 inches high, from the ground to the rooftop, and has 7 inches clearance under the worm.

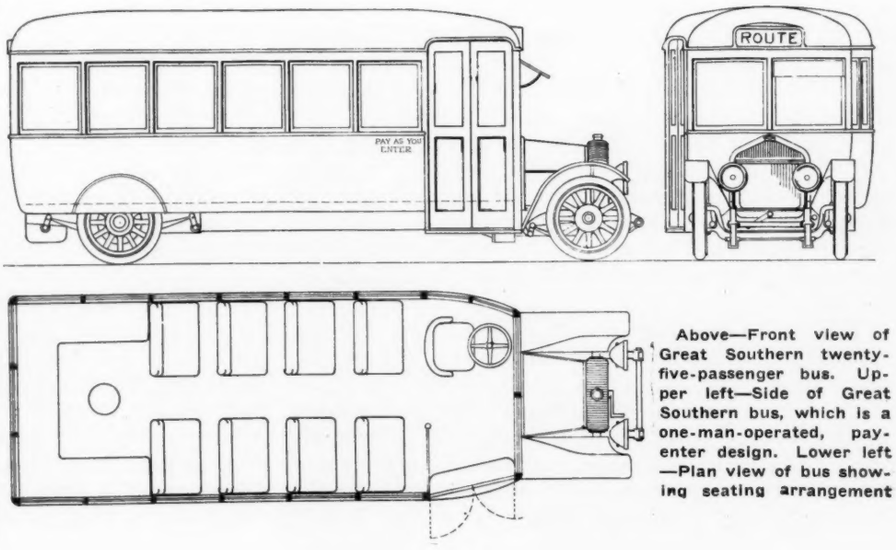
Twenty-five passengers are carried on a single deck, all of the seats being of the transverse type except at the rear where a rotunda arrangement allows room for the rear wheels. It is expected to have the new buses ready for the market in June.

197-Inch Wheelbase

In detail, the vehicle is built upon a heavy pressed steel drop frame with a 197-inch wheelbase, the front axle being deeply dropped and the rear of the frame having a high arch over the rear axle. Long, half-elliptic springs are fitted both front and rear, both sets underslung. These springs are 3 inches wide, and auxiliary springs to take care of any standing load are also provided. Tread is 65 1-2 inches. The worm-gear has a reduction of 7 3-4 to 1.

The 4 1-8 by 5 1-4-inch motor forms a unit with the dry-disk clutch and three-speed selective gearset. The motor is cast in block with the valves on the left. It is cooled by a centrifugal pump and a built-up cast-case finned-tube radiator. Dual Bosch ignition with hand spark control is provided and the motor is governed by a motor-driven Pierce governor. This governor is set at 1,057 r.p.m., or 16 miles per hour in high gear.

The door is two-leaf folding, operated by a crank at the driver's hand. When closed it is flush with the side and conceals the steps. The driver's seat is to the left and the body, which is made by the Great Southern company, is of metal with ash and metal framing, metal panelling, metal roof, wood doors and sash and metal moulding. The seats are of cane. Tires are solid, 36 by 5 inches in front and 36 by 4 dual in the rear.



Above—Front view of Great Southern twenty-five-passenger bus. Upper left—Side of Great Southern bus, which is a one-man-operated, pay-enter design. Lower left—Plan view of bus showing seating arrangement

The Automobile

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S. A. E. Efficiency

THE establishment of a central station in Detroit, the heart of the factory situation in the automobile industry, marks a step in advance in the efficiency of the work of the standards committee of the Society of Automobile Engineers. While the work of this committee has been one of the bright spots in the automobile industry, the establishment of a record bureau and the formulation of a set of standard regulations for the conduct of the work of the committee and its many divisions cannot but result in the elimination of duplication in labor and better efficiency.

The use of the record bureau puts into the hands of the committee chairman exact information as to what each division of his committee is doing. It will enable him to spur on those who lag and also to hold in its particular province each division of the standards committee. It gives a complete checking system on all the work and cannot help for this reason but be an economical asset to the entire society.

This same idea should be followed out by the standards committee in other ways. There are other logical central points which should form the seats of conference of these men who are endeavoring to cut the costs in manufacture and promote national interchangeability. Toledo, Cleveland and possibly other cities which are representative of the manufacturing interests would be other logical points at which conferences could be held with the certainty of obtaining the attendance of men to whom the problems of factory management are close to heart and who will come from sheer self interest. This is the attendance which causes progress in the work of manufacturing standardization and therefore is not only desirable but necessary if true progress is to be made and justice done in standardization work as applied to production.

Humanized Metallurgy

MOST automobile owners and many engineers have only very vague ideas as to the real meaning of modern metallurgical terms. The steel scientist has created a great many new words which have been seized upon by the salesmen of both steel maker and automobile manufacturer and used by them without any appreciation beyond the advertising value of a high sounding and mysterious name. Ask the average man why steel is not simply steel just as copper is copper or gold gold and he would not be able to offer a very coherent explanation. Pure copper is the best sort of copper, why not pure steel?

Commencing in this issue THE AUTOMOBILE explains this in simple language; in a way that anyone can grasp without knowledge of any more science than is necessary to appreciate the need for difference in diet in summer and winter or difference in clothing called for by the tropics or the arctic. So much nonsense is talked about materials of automobile construction by people possessing a list of the metallurgist's terms and little more, that it is worth while to obtain a broad understanding of the subject. It is all quite easy, quite simple and quite free from mystery when ordinary words are substituted for jargon.

A Jitney Endurance

THE success of the jitney car will largely be a matter of the human intelligence of the man owning it, driving it and caring for it. Certain men can make a living out of the small jitney car, whereas other men will fail. The man who knows how to take care of a car, who is thrifty, who has good average business sense, and who combines these qualities with certain mechanical ability, will succeed. The man who will fail in the jitney field will be the same one who fails at everything else, plus the lack of mechanical ability. There is a wide range of differences among jitney drivers, and the success of the cars is invariably measured by the success of the people controlling them.

The fact that in some cities fifty-six of the original 100 jitney cars are still in business and making money, is proof of the part played by the human factor. Perhaps later, not more than ten out of the original 100 will continue in business, but if 10 per cent. should prove successful this will be a higher percentage than is crowned with success in many other ventures for what is true of the jitney business is true of other industries.

Shipper Wins Freight Car Shortage Case

May Sue Either in Federal or State Courts for Damages in Case of Discrimination in Furnishing of Cars

WASHINGTON, D. C., April 5—A shipper may sue either in the Federal or state courts for damages in case of discrimination or failure for any reason in the furnishing of cars, according to a decision handed down today in the United States Supreme Court, in a case of the Pennsylvania Railroad Co. against the Puritan Coal Mining Co.

The case arose out of the failure of the carrier in the period of the coal strike in 1902 to furnish the proper quota of cars to the Puritan Coal Mining Co., and the company set up a claim for a loss of profits amounting to $260,777.

Justice Lemar, in the decision, holds that Section 3 of the Interstate Commerce act makes it unlawful for the carrier to prefer one shipper over another, and that Section 8 gives the shipper the right of action for damages by presentation of his case to the Interstate Commerce Commission for a determination of the facts, and then by suit in the Federal Courts having exclusive jurisdiction. With these two sections standing alone, the shipper would have had no remedy in the state courts, but under Section 22 of the act it is provided that there shall be no abridgment of remedies now provided at common law or statute, so that all three sections must be read together with the result that Sections 8, 9 and 22 give the shipper new rights and protect those he has already enjoyed.

While former decisions provide that suits for discrimination must be passed on first by the Interstate Commerce Commision, and that until the commission has passed on the case no court has any jurisdiction, the decision today holds that if the carrier's rule shows on the face of it that it has been unequally applied and suit is brought for damages by violation, there is no administrative question involved, and the state courts may decide on the facts, the shipper having under the express terms of the statute the right to go into either state or Federal courts. The decision holds that the liability is the same whether there is a breach of common law duty to furnish cars or discrimination in the supply of cars.

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DETROIT, MICH., April 2—The Interstate Commerce Commission has decided that railroad companies have not been unreasonable in charging $2.15 per 100 pounds on shipments of automobile truck axles from this city to Los Angeles, Cal. The decision was made in connection with the plea of the Moreland Motor Car Co., Los Angeles, Cal. This concern, which makes motor trucks, had been buying its axles in Detroit and received some shipments which were billed at the rate of $1.15 per 100 pounds. Later the railroads raised the rate to $2.15 per 100 pounds, which the car manufacturer declared was exorbitant. Since the opening of the Panama canal the Moreland company has been receiving its shipments of axles over that route, the axles being first shipped to New York.

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Reddig King Chief Mechanical Engineer

DETROIT, MICH., April 6—C. E. Reddig, assistant chief engineer of the Timken-Detroit Axle Co., during the past year and previously connected with the engineering departments of the Stoddard-Dayton, Maxwell-Briscoe and Columbia companies, has been appointed chief mechanical engineer of the King Motor Car Co. P. F. Todd has been appointed chief draftsman of the company. During the last 3 years he held a similar position with the Northway Motor Mfg. Co., and previous to that was with the Buick and E. M. F. companies. C. E. Jacobs, who was the King company's chief draftsman, has been appointed chief inspector.

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JERSEY CITY, N. J., April 6—S. P. Woodard, for many years connected with the automobile industry, has been appointed general sales manager of the tire and tube department of the New Jersey Car Spring & Rubber Co., of this city. For the past 8 years, this concern, which was established in 1858, has manufactured and sold car springs, tires and tubes. It has branches in Chicago, Cleveland, Los Angeles, New York, Philadelphia and Pittsburgh, and contemplates opening a retail store in New York.

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PHILADELPHIA, PA., April 5—Architects are preparing plans for a three-story addition, 40 by 108 feet, to the plant of the Hess-Bright Manufacturing Co. at Front street and Erie avenue.

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NEW YORK CITY, April 5—The eleventh annual automobile outing for the local orphans will be held June 3. It is the intention of the Orphans' Automobile Day Assn. of New York to take 5,000 on this year's outing.

The association met last week and elected officers for the ensuing year. W. J. Morgan, founder of the original orphans' day, was unanimously elected president. W. S. Silver was elected first vice-president; C. A. Stewart, second vice-president; G. H. Robertson, treasurer; A. L. Prindle, secretary; J. J. Korbel, acting secretary, and Frank Griffin, counsel.

Massachusetts Registrations May Reach 95,000

Gain of 15,000 in First 3 Months of 1915

BOSTON, MASS., April 3—Present indications point to the registering of at least 95,000 cars in Massachusetts during 1915, and the receiving of more than $1,000,000 in registration fees from motorists, according to E. J. O'Hara, who has charge of the registration department of the Massachusetts Highway Commission. For the first 3 months of 1915 more than 60 per cent. of the total registrations for last year have been sent in, and close to $700,000 have been received in fees. The gain over the first 3 months of last year is nearly 15,000 cars and $170,000. There has been a big gain in the trucks, too. Last year for the first 3 months there were 5,200 commercial vehicles registered, while this year so far 7,800 are listed. As there were 8,236 trucks registered for all of 1914 it indicates that business is going to be good for that line, too. As the tax collectors make their rounds on April 1 looking for property a lot of people who have bought cars stipulated that they should not be delivered until after that date so as not to be included in last year's tax list, and to escape the coming year as much as possible. So from now on there will be another big rush at the registration department. The following figures show how the registrations compare for all of 1914, and for the three months of this year with the 3 months of last year:

	Jan., Feb., Mar., '14	Jan., Feb., Mar., '15	Total, 1914
*Motor Veh.	41,750	56,931	77,246
Commercial	5,200	7,800	8,236
Motor Cyc.	2,262	3,995	8,161
Commercial	5,200	3,995	8,161
Mfgs. & Dlrs.	1,300	1,489	1,518
Licenses	3,355	5,826	26,858
Renewals	15,151	15,848	72,674
Examinations	1,458	1,855	7,497
Receipts	$512,183.04	$682,524.05	$925,964.75

*Total, including trucks.

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DOVER, N. J., April 5—The International Peace Brotherhood, with officers at The Hague, will build automobiles, marine motors, aluminum castings and pressed and spun wares in this city. Through the medium of the Dover Board of Trade the Brotherhood will locate its first American office and factory in this city. The site comprises 7 acres. Work on the construction of the buildings will commence in the near future. The new industry will employ 200.

Partin Cars Are To Be Continued

Commonwealth Motors to Act as Selling Agent—G. D. Whitcomb Co. To Manufacture Them

CHICAGO, ILL., April 3—The Commonwealth Motors Co., with C. C. Darnell as president, has been organized with a capital of $100,000 to act as selling agent for the Partin-Palmer cars, taking over the functions of the Partin Mfg. Co. The manufacturing end of the business will be undertaken by the George D. Whitcomb Co., of Rochelle, Ill., an old established concern which has been manufacturing gasoline motors and electrical mining machinery. The general offices of the Commonwealth company will be maintained at 29 South La Salle street, Chicago, while the manufacture of the Partin-Palmer cars will be carried on at Rochelle.

President Darnell formerly was identified with the Partin Mfg. Co. as sales manager, but severed his connection last fall, before the American Mfg. Co., which had the manufacturing end of the combination, got into financial difficulties which closed its plant. These court proceedings, however, did not involve the Partin company itself, which was left free to enter into this new deal whereby its good will and its 1915 contracts with some 400 dealers are taken over by Mr. Darnell and his colleagues.

Shipments of parts and machinery from the old plant here in Chicago, formerly occupied by Staver, are being made now, and it is anticipated that cars will be turned out from the Rochelle factory at once, so that shipments may begin almost immediately. It is said that the company now has orders booked for 800 cars.

It is declared that this deal permits the new combination to start out without any embarrassment from the previous arrangement and that there will be very little interruption in the marketing of Partin-Palmer cars.

Associated with Mr. Darnell are W. H. Conklin, who has been elected secretary and sales manager, and T. J. Shanahan, formerly production manager, who will be connected with the manufacturing end of the business. Outside of these there are none left from the old régime. W. C. Whitcomb, president of the Whitcomb company, is vice-president of the Commonwealth, while D. G. Kingery, a brother-in-law of Mr. Whitcomb, will serve as treasurer.

Kline Company To Resume Operations

RICHMOND, VA., April 2—Bondholders who recently acquired possession of the plant and equipment of the Kline Motor Car Corp., this city, are now planning to get together and to arrange, at a meeting to be held in the near future, a definite program for the operation of the plant on full time and a complete resumption of business. Reorganization on a larger scale will be effected and in the mean time the plant is running.

Overland Surplus for 6 Months $2,853,864

NEW YORK CITY, April 6—The semi-annual report, ending December 31, 1914, of the Willys-Overland Co., Toledo, O., shows a surplus of $2,853,864 equal to 14.26 per cent. on the $20,000,000 common stock for 6 months.

Preferred dividends amounted to $165,235 on $4,721,000 in the stock, and the common dividend was $600,000. The balance sheet as of December 31, 1914, shows the cash account equal to $3,928,098, real estate, buildings, plant and equipment, $9,127,188. Balances due from European distributing agent and affiliated domestic selling companies, $901,942; and deferred charges to future operations, $124,943. Under the liabilities, the company has listed: reserve for quantity and other rebates to customers, $235,485; reserve for car repairs under guarantee, $30,000; reserve funds, $834,005; and profit and loss surplus, $7,651,931.

Rubber Goods Earnings $2,193,220

NEW YORK CITY, April 5—The Rubber Goods Mfg. Co. reports for the year ended December 31, last, net earnings of $2,193,220 as against $2,325,954 for 1913. Dividends amounted to $2,143,984 as against $2,862,518 for 1913. The total surplus for 1914 was $9,003,042 as against $8,576,510 for 1913. The balance sheet, as of December 31 last, shows cash amounting to $3,115,153 and total assets and liabilities of $53,937,815. The report states that two considerations materially affected the amount of sales in 1914, namely, the lower level of tire prices and the general business depression due to the European war.

Vacuum Oil Earns $2,075,644 in 1914

NEW YORK CITY, April 2—The Vacuum Oil Co.'s annual report of its 1914 business, ending December 31, 1914, shows a decrease in profits which was fully anticipated, owing to the interruption of commerce resulting from the war. What the total earnings of the company were in 1914 is not stated in the annual report, but exclusive of the company's share of profits in its foreign subsidiaries, net earnings were $2,075,644, a decrease of $1,300,130. In 1913 the profits from the foreign companies amounted to $1,457,156 additional.

The reduction in the capital requirements has made it possible for the company to declare a 2 per cent. extra dividend. The balance sheet shows an increase in real estate, from $3,501,109 in 1913 to $4,139,791 in 1914. Accounts receivable amount to $9,118,050, of which $6,609,087 is due from foreign Vacuum Oil companies. Owing to the war it is not possible to determine the undivided profits on the shares held by the company in the various foreign marketing companies. While there has been some growth of business, cash surplus has increased from $1,096,661 in 1913 to $3,152,417 in 1914, due to a temporary reduction in capital requirements.

Detroit Steel Products Adds $750,000 Capital

DETROIT, MICH., April 5—At a recent meeting of the board of directors of the Detroit Steel Products Co., the capital stock was increased from $500,000 to $1,250,000, the increase consisting in $500,000 in common stock and $250,000 in preferred. The latter stock was provided in the form of a 50 per cent. dividend. The plant is being operated 24 hours a day. Business in March was the best the company had since it was started. Indications are that the year will be much better than 1914.

Detroit Steel Products Adds $750,000 Capital

JACKSON, MICH., April 5—This year the production of the Hayes Wheel Co. is expected to reach the million and one-half mark, according to officials of the company. The concern started in business in 1908 and has made automobile wheels ever since. In 1909 its output totaled 81,416 wheels, in 1910 this total was 145,660, the output in 1911 was 228,576, in 1912

Market Reports for the Week

NEW YORK CITY, April 7—Changes in this week's market reports occurred for the most part in the metals. Tin was lower and the market was dull with prices prevailing around $48.00 per 100 pounds. Lead was strong and active at 5 cents per 100 pounds higher than last week, now quoting at $4.20. Copper this week was firmer but quiet. Sales in electrolytic for war purposes were reported. Pennsylvania petroleum dropped to $1.35 per barrel on Saturday. A firmer tone developed this week in the rubber market, but aside from that, there were no other developments in the situation. Fine Up-River Para was more or less erratic in its prices, going down to 57 cents on Saturday and then closing at 58 1-2 at a gain of 1-2 cent for the week.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.21½	.21½	.21½	.21½	.21½	.21½	.....
Beams & Channels, 100 lbs.	1.26	1.26	1.26	1.26	1.26	1.26	.....
Bessemer Steel, ton.	18.00	18.00	18.00	18.00	18.00	18.00	.....
Copper, Elec., lb.	.15¾	.15¾	.15¾	.15¾	.15¾	.15¾	.....
Copper, Lake, lb.	.16	.16¼	.16¼	.16¼	.16¼	.16¼	+.00¼
Cottonseed Oil, bbl.	6.56	6.59	6.55	6.62	6.60	6.55	—.01
Cyanide Potash, lb.	.21	.21	.21	.21	.21	.21	.....
Fish Oil, Menhaden, Brown	.41	.41	.41	.41	.41	.41	.....
Gasoline, Auto, bbl.	.12	.12	.12	.12	.12	.12	.....
Lard Oil, prime	.92	.92	.92	.92	.92	.92	.....
Lead, 100 lbs.	4.15	4.20	4.20	4.20	4.20	4.20	+.05
Linseed Oil	.62	.62	.62	.62	.62	.62	.....
Open-Hearth Steel, ton	18.50	18.50	18.50	18.50	18.50	18.50	.....
Petroleum, bbl., Kans., crude	.40	.40	.40	.40	.40	.40	.....
Petroleum, bbl., Pa., crude	1.40	1.40	1.40	1.35	1.35	1.35	—.05
Rapeseed Oil, refined.	.75	.75	.75	.75	.75	.75	.....
Rubber, Fine Up-River, Para	.58	.58	.58	.57	.58	.58½	+.00½
Silk, raw, Ital.	..	3.90	..	..	3.90	3.90	.....
Silk, raw, Japan	..	3.57½	..	..	3.55	3.52½	—.05
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lb.	51.00	49.00	48.00	48.00	48.00	48.00	— 3.00
Tire Scrap	.04¾	.04¾	.04¾	.04¾	.04¾	.04¾	.....

the production was 322,599 wheels; there was only a slight increase in 1913, when the output totaled 333,523; production more than doubled in 1914, when 844,608 wheels were made.

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NEW YORK CITY, April 5—The United States Rubber Co. has declared regular quarterly dividends of 1 1-2 per cent. on the common stock, 2 per cent. on the first preferred stock and 1 1-2 per cent. on the second preferred stock. Dividends are payable April 30 to stock of record April 15.

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DETROIT, MICH., April 2—Preferred stockholders of the Continental Motor Mfg. Co., received the semi-annual dividend of 3 per cent., Thursday, April 1.

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NEW YORK CITY, April 5—A dividend of 1 1-2 per cent. on the common stock of the Kelly-Springfield Tire Co. has been declared, payable May 1, 1915, to the stockholders of record at the close of business April 15, 1915.

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EAST PALESTINE, O., April 1—The McGraw Tire & Rubber Co., East Palestine, O., has declared the regular quarterly dividend of 1 3-4 per cent. on its preferred stock, payable April 1 to stockholders of record March 20.

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National Gauge and Equipment Replaces Hans

LACROSSE, WIS., April 5—The Hans Motor Equipment Co. has been re-incorporated under a new name, articles of incorporation for the National Gauge and Equipment Co. with a capital of $200,000 having been filed recently with the local register of deeds by P. M. Gelatt, D. G. MacMillan and J. M. LaVaque as its incorporators. Officers of the firm have not been elected.

The incorporation of the company is the result of a meeting held March 15, at which it was decided to take over the interests of J. H. Hans, president, Edmund Hans, vice-president of the Hans company.

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Reorganization Plan Outlined for U-S-L

BUFFALO, N. Y., April 7—The reorganization plan of the United States Light & Heating Co. provides that a new company be organized with a capital of $3,000,000 7 per cent. non-cumulative preferred stock, and $4,000,000 common stock. The preferred is to to have the right to elect a majority of the board of directors and will be held in a voting trust for 5 years. It is also proposed to authorize $1,000,000 first mortgage sinking fund 6 per cent. 20-year gold bonds, of which $500,000 are to be issued and sold at present. Preferred stockholders are given the right to subscribe to the new preferred stock and upon the payment of $15 per share of their present holdings will receive share for share in new preferred stock. Common stockholders will be given the privilege of subscribing to the preferred and common stock of the new company, and upon the payment of $2.50 per share of their present holdings of common stock will receive $5 in new preferred and $20 in new common stock.

Both common and preferred stockholders of the old company may subscribe for the new bonds at the price of $875 for each $1,000 bond. Subscriptions to the new stocks must be paid on or before May 5 next. The debts of the company, with expenses of receivership, amount to nearly $800,000.

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Automobile Securities Quotations

NEW YORK CITY, April 6—Automobile and accessory securities this week were marked, in a majority of cases, by their erratic price fluctuations. Trading, however, continued very active, and at the closing yesterday, the automobile issues showed their strength in the face of the disturbing influence of violent fluctuations, up and down, by registering large gains for the week.

All of the automobile stocks listed on the Exchange made substantial gains. In fact, almost all of the other stocks showed gains, the few declines being small. In a number of cases, especially in the tire issues, the gains were very large.

On April 1 the minimum prices on stocks and bonds on the Stock Exchange became ineffective, evidencing that bankers consider financial conditions completely in hand, and reflecting the great improvement in this country's trade. Minimum prices have been the order since December 12, when the Exchange reopened. The abolition of the minimum prices in this city, it is said, will doubtless automatically remove the minimums in force for London trading. On March 31, the heaviest day's trading in stocks since December 12 occurred, when 737,475 shares changed hands. Trading in bonds of $4,306,500 was the heaviest since the Exchange reopened. Optimism in Wall street has been keyed up by the discussion of an early peace. The outlet for this optimism has been the stock and bond market.

The largest gains this week were made in tire issues when Firestone common went up 40 points; Goodyear common rose 12 points; and Kelly-Springfield common closed with a 12-point gain. The rest of the tire securities showed gains ranging from 1¼ to 7 points.

Maxwell Motor issues advanced sharply, the common showing a gain of 9 points; the first preferred, 7 points; and the second preferred, 7⅛ points. Studebaker, on dividend talk, advanced 9¾ and 6½ points on both its common and preferred, respectively.

In the Detroit quotations, the majority of the stocks show substantial gains. Chalmers common went up 8 points; General Motors common and preferred gained 5 and 3 points respectively; Maxwell common went up 9½ points, while both its first and second preferred went up 6 points; and Studebaker common and preferred went up 10½ and 6 points.

	1914 Bid	1914 Asked	1915 Bid	1915 Asked	Net Ch'ges
Ajax-Grieb Rubber Co. com	200	..	285	..	..
Ajax-Grieb Rubber Co. pfd	99	102	100	..	..
Aluminum Castings pfd	98	100	98	100	..
J. I. Case pfd	..	..	76	85	—2
Chalmers Motor Company com	..	83	80	86	..
Chalmers Motor Company pfd	90	94	90	92½	..
Electric Storage Battery Co	..	..	47¾	48½	—1¼
Firestone Tire & Rubber Co. com	280	285	438	445	+40
Firestone Tire & Rubber Co. pfd	107	108	110	112	..
General Motors Co. com	75½	76¾	126	128¾	+2
General Motors Co. pfd	94	94½	102½	103	+3
B. F. Goodrich Co. com	24	24½	43	43½	+6½
B. F. Goodrich Co. pfd	86	88¼	99½	100½	+2¾
Goodyear Tire & Rubber Co. com	170	175	220	225	+25
Goodyear Tire & Rubber Co. pfd	94	95	102½	104½	—1
Gray & Davis, Inc., pfd	90	97	..	..	..
International Motor Co. com	..	5	5½	6½	—2½
International Motor Co. pfd	..	15	18	22	—4
Kelly-Springfield Tire Co. com	59	60	129	131	+12
Kelly-Springfield Tire Co. 1st pfd	145	150	83¾	84½	+2¾
Kelly-Springfield Tire Co. 2d pfd	..	..	130	131	+7
Maxwell Motor Co. com	7	7½	46	46⅜	+9
Maxwell Motor Co. 1st pfd	33½	35	85	85¼	+7
Maxwell Motor Co. 2d pfd	13	13½	39¾	40	+7⅛
Miller Rubber Co. com	..	..	170	176	+5
Miller Rubber Co. pfd	..	..	101	103	..
New Departure Mfg. Co. com	..	..	139	144	+5
†New Departure Mfg. Co. pfd	..	..	105	..	..
Packard Motor Car Co. com	102	116	80	92	..
Packard Motor Car Co. pfd	94	96	93¾	97½	..
Peerless Motor Car Co. com	20	30	20	21	..
Peerless Motor Car Co. pfd	..	80	..	55	..
Portage Rubber Co. com	..	30	34	36	..
Portage Rubber Co. pfd	..	85	85	95	..
*Reo Motor Truck Co	7	8¼	12½	..	+1
*Reo Motor Car Co	19	20	30	30½	+1¾
Splitdorf Electric Co. pfd	..	..	..	..	..
Stewart-Warner Speed. Corp. com	61½	62½	58½	59½	+1½
Stewart-Warner Speed. Corp. pfd	98½	106	102	105	— ½
Studebaker Corporation com	34½	35	60¾	61½	+9¾
Studebaker Corporation pfd	86	86½	99½	100½	+6½
Swinehart Tire & Rubber Co	60	67	80	85	+5½
Texas Company	..	..	138	139	+4
U. S. Rubber Co. com	62¼	62½	64⅞	65¼	+ ⅞
U. S. Rubber Co. pfd	103¼	104¼	106¼	106½	+1¼
Vacuum Oil Co	..	..	199	201	..
White Co. pfd	107	110	103	108	..
Willys-Overland Co. com	65	67	125	126	+4½
Willys-Overland Co. pfd	89	94	100⅝	101½	+1⅝

*Par value, $10; all others $100 par value.

†Ex-dividend.

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS

	1914 Bid	1914 Asked	1915 Bid	1915 Asked	Net Ch'ges
Chalmers Motor Co. com	..	83½	82	88	+8
Chalmers Motor Co. pfd	90	93	90	92½	..
Continental Motor Co. com	150	..	160	180	—5
Continental Motor Co. pfd	..	75	78	82	—2
General Motors Co. com	75	77	128	130	+5
General Motors Co. pfd	90	92	102	103¾	+3
Maxwell Motor Co. com	6¾	7¾	45	47	+9½
Maxwell Motor Co. 1st pfd	33	35	83	85	+6
Maxwell Motor Co. 2d pfd	11¾	12	38½	41½	+6
Packard Motor Car Co. com	103	..	80	92	..
Packard Motor Car Co. pfd	94	98	93¾	97½	..
*Reo Motor Car Co	19¼	20¼	30	..	—1¼
*Reo Motor Truck Co	7¾	8¾	12⅞	13½	+1⅞
Studebaker Corporation com	..	..	60½	62½	+10½
Studebaker Corporation pfd	..	..	99	101	+6

INACTIVE STOCKS

*Atlas Drop Forge Co	..	21	..	..	..
Ford Motor Co. of Canada	..	550	550	..	..
Kelsey Wheel Co	195	..	190	200	..
*W. K. Prudden Co	..	21	19	20½	+ ¼
Regal Motor Car Co. pfd	..	45	10	20	—5

BONDS

General Motors, notes, 6s, 1915	100¾	101½	101	..	+ ⅝
Packard Motor Co. 5s, 1916	95	98½	95	..	..

*Par value $10; all others $100 par value.

Detroit Wants More Accessory Plants

Manufacturers Receiving Letters Explaining Advantages Derived from Locating There

DETROIT, MICH., April 2—The Detroit Board of Commerce is sending a special letter to all manufacturers of automobile accessories in the country with a view of getting them ultimately to locate there, or rather, to move to this city.

Four reasons are given why the accessory makers should locate in Detroit. First, because Detroit is the center of the automobile industry of the world, and as such is the place to get skilled labor; second, because the city is known the country over as an open shop town, only 10.2 per cent. of the wage-earners being organized; third, because it is easier to sell automobile accessories from Detroit than from any other place in the world; fourth, on account of the unexcelled railroad facilities and the lake transportation which saves freight charges.

Here are some statistics compiled by the Industrial Bureau of the Board of Commerce:

The population of Detroit is 658,970, the monthly increase being about 4,000. In 1914 the total bank clearings amounted to $1,349,000,000. The savings deposits amounted to $141 per capita, while the average for the United States is $35. Detroit's tax rate for 1915 is $19.80 per $1,000 on assessed valuation.

Artificial gas is furnished at the following rates: Less than 50,000 cubic feet, 85 cents per 1,000 cubic feet; the second 50,000 cubic feet, 75 cents per 1,000 cubic feet; for the next 100,000 cubic feet, 65 cents per 1,000 cubic feet; all over 200,000 cubic feet, 55 cents per 1,000 cubic feet. Gas engines, 65 cents per 1,000 cubic feet.

There is a deduction of 10 per cent. per 1,000 cubic feet if paid within discount period.

A comparison of first-class freight rates per 100 pounds from Detroit to various important cities shows the local rates to be very low:

From: To:	New York	Phila.	Chicago	New Orleans	Montreal	San Fran.
Detroit	61.5	59.5	38.9	1.16	61.5	3.50
Cleveland	55.9	53.9	43.1	1.16	67.8	3.60
Buffalo	47.3	41.3	47.3	1.16	46.2	3.60
Chicago	78.8	76.8		1.10	78.8	3.40
Cincinnati	68.6	66.6	42	.98	74.9	3.50
St. Louis.	92.2	90.2	45.5	.90	92.2	3.30

The following transportation companies operate from Detroit:

Anchor Line
Ashley & Dustin Line
Canadian Pacific R. R.
Detroit & Cleveland Navigation Co.
Detroit Terminal Railroad
Detroit & Toledo Shore Line
Detroit, Toledo & Ironton R. R.
Detroit United Railway
Grand Trunk Railway
Michigan Central R. R.
New York Central Lines
Pere Marquette R. R.
Star-Cole Line
Wabash Railroad
White Star Line

Jeffery Reduces Four-Cylinder $300

KENOSHA, WIS., April 5—The Thomas B. Jeffery Co. has reduced the price of its four-cylinder model from $1,450 to $1,150. Co-incident with this announcement is the one that the Jeffery company has received $4,000,000 worth of truck orders in 3 weeks so that 500 men have been added to the factory working force, the entire staff now working 24 hours a day in three 8-hour shifts.

Baker Reduces Prices on Three Models

CLEVELAND, O., April 6—The Baker Motor Vehicle Co., this city, has reduced the price on three of its models, namely, the D. A. coupé, from $2,800 to $2,475; the Double Drive Brougham from $3,250 to $3,000; and the W. A. roadster from $2,300 to $2,000.

Ford Buys More Detroit Land

DETROIT, MICH., April 2—The Ford Motor Co., has purchased a tract of land covering 56.7 acres which is located opposite its plant in Highland Park. The land was owned by the Chevrolet Motor Co., Flint, Mich., which purchased it from the Highland Park Land Co., 2 1-2 years ago, paying at that time approximately $250,000. The Ford company has now paid about $580,000 for the ground.

There was a rumor about a year ago that there were negotiations pending between the Ford and the Chevrolet companies as the former concern wanted to get the land, but the report was denied at the time.

The property has a frontage of 920 feet on Woodward avenue, 920 feet on Hamilton boulevard and 2,640 feet along the terminal railway. The ground covers exactly 56.7 acres and is exempt from all incumbrances.

When asked as to what will be done with the property, officials of the Ford company said that nothing had been decided and that probably the land will remain as it is for many months.

March Car Shipments 16,316 Carloads

NEW YORK CITY, April 7—According to reports received at the directors' meeting of the National Automobile Chamber of Commerce this afternoon, freight car shipments of automobiles for March were 16,316 carloads, or an increase of 25 per cent. as compared with the 13,117 carloads for the same month last year. January and February also showed an advance over the figures for 1914, while the 3 months showed greater shipments of cars than for any similar period in the history of the industry. Both motor trucks and passenger cars were more in demand than ever.

The commercial vehicle committee's report showed excellent progress in plans for the convention to be held at Detroit, May 5 and 6. Eight or ten important papers will be read and discussed.

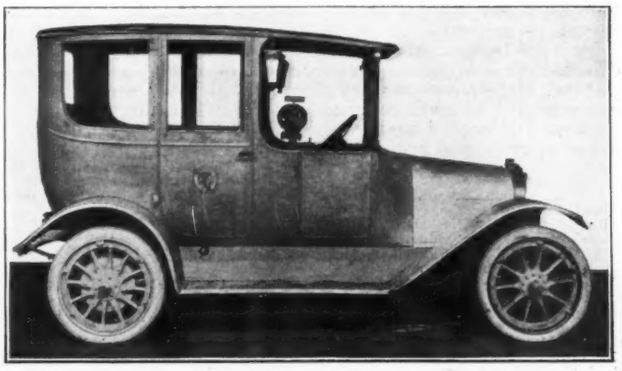
The good roads committee reported increased interest in favor of Federal road improvement. It was shown that although the burden of this would fall most heavily on city residents, these people have been the strongest advocates of the movement.

Among those in attendance were: Charles Clifton, Wilfred C. Leland, E. R. Benson, S. T. Davis, Jr., C. C. Hanch, Wm. E. Metzger, H. H. Rice and Alfred Reeves, general manager.

INDIANAPOLIS, IND., April 5—The Oakes Co., Indianapolis, manufacturer of the Beartone horn and fan combined, has made public the announcement that the price of this combination has been reduced to $5.

Atlas Company Enters Chicago Taxicab Field with Half Rates

CHICAGO, ILL., April 1—Upon the heels of the reduction in the legal rates of fare for taxicabs by the recent action of the city council, there is announced by a new cab concern a further cutting of the schedule which makes the use of taxis still less expensive. The rate war, if there is to be such, is brought on by the entrance of a new company



One of the taxicabs of the Yellow Cab Co., Chicago, Ill.

in the field, the Atlas Co., whose rates, it is announced, will be from two-thirds to one-half the present schedule and considerably lower than the new ordinance rates which go into effect in 2 weeks.

The Atlas company proposes to use a fleet of twenty-five 1915 Chalmers limousines and the rates as compared with the present and new ordinance schedules are as follows:

	Present Rate	New Ordinance	War Rate
First mile	$.70	$.60	$.50
Each additional ¼ mile	.10	.10	.05
Each additional passenger	.20	.15	.10
Each hour wait	1.50	1.50	.80

Announcements of the new company followed immediately upon the publication of the plans of the new Yellow Cab Co., which were outlined last week in THE AUTOMOBILE. This company whose officers are the same as those of the Walden W. Shaw Co., is putting on the streets 100 cabs to be operated strictly on the European plan. That is, the method followed in Europe is to be employed, in which taxis are picked up on the street or on public stands instead of from the private branches at clubs, hotels and cafes. Also, the European system is on a strictly cash basis, charge accounts being unusual. The Yellow Cab company's vehicles will be painted yellow, to distinguish them from the Shaw cabs. They are much lighter and more economical than the latter, but they seat four passengers and are fitted up in the same style as the others.

Pedestrian Partly Responsible for Accidents, Says Wisconsin Court

MILWAUKEE, WIS., April 6—The Supreme Court of Wisconsin extends advice to automobilists in an important decision which absolves H. J. Lindenmann, a Milwaukee motorist, from blame in connection with the injury of Mrs. Catherine Parkes of Milwaukee, who was struck by Lindenmann's car. The decision establishes an important precedent in the matter of driver's liability and is greeted with satisfaction by motorists, inasmuch as the pedestrian is charged with at least some responsibility.

The court says in part: "Many prudent chauffeurs deem it safer to pass in front rather than behind persons standing in the street. By so doing they pass in the line of vision of persons standing and are less likely to frighten them, even though they come closer. A driver cannot be charged with prescience nor with a reasonable anticipation of possible, but only of probable results. Lindenmann had every reason to believe that from the time he entered National avenue he was within the line of vision of Mrs. Parkes, where she stood waiting for the approaching car. He took a course that in all probability seemed to be outside of where she would be likely to be or go, and yet where she would see him. That the fact turned out to be otherwise does not alter the case."

Mrs. Parkes was injured in 1908 while standing in the street waiting for a car. Evidence showed that as Lindenmann attempted to pass in front of her she walked forward. He then turned his car to pass behind her but she stepped back and was struck. A verdict of $7,500 damages in the first trial was set aside as perverse. A jury in the second trial awarded her $4,000, but the trial judge reduced this to $2,500. The supreme court now orders a reversal of judgment and dismissal of the case on the merits of Lindenmann's plea.

Speedwell Assets Purchased by Puritan Machine

DETROIT, MICH., April 5—The Speedwell Motor Car Co., which has been manufacturing automobiles and trucks for the past 8 years in Dayton, O., has been purchased by the Puritan Machine Co., Detroit, Mich., and in an interview with A. O. Dunk, President, he advises that business will be continued at its plant in Detroit and all the assets are now being moved to that city. They will also render complete service and supply repair parts to all owners of Speedwell motor cars and trucks. All original patterns, drawings and engineering data were included in the purchase, so that they are in a position to duplicate any part in case that same is not in stock ready for immediate shipment. This is the sixty-first company whose assets have been purchased by the Puritan Machine Co.

MARION, O., April 5—Upon the application of the Marion County Bank, C. H. Lewis of Harpster, O., has been appointed receiver for the Ohio Tractor Mfg. Co., Marion, O. The bank seeks to collect on a chattel mortgage of $20,000 against the machinery in the plant. W. H. Bones of Marion; Ezekiel Brown of Morral and the Ohio Roller Sales Co. are named as co-defendants. The total amount of claims, secured by chattel mortgage, amount to $58,000.

Mass. Legislature Favors Motorists

Nearly 30 Bills Presented—Few Reported Out of Committee—Good Roads Receive Much Attention

BOSTON, MASS., April 3—As far as automobilists are concerned this year, the Massachusetts legislature has made a new record, that of practically letting the industry alone. Out of all the bills presented, numbering close to thirty, but a few have been reported out of the committee, and these did not amount to very much. Some were favorable to motorists. The Roads and Bridges Committee had the greater part, as it does every year. This year the Bay State had the best committee that ever handled motor legislation, for there were no delays, and everyone got fair consideration. But the freaks were quickly eliminated. There were no clashes among the motor organizations this year. At the beginning of the session the Bay State A. A. legislative committee secured a meeting of other organizations and discussed the different bills so that uniform action might be had.

There were a number of bills on headlights calling for dimming them in various ways in different sections. The motor organizations suggested that the whole matter be turned over to the Highway Commission for consideration. So the committee reported a resolve that the commission take the matter up for investigation and report to the legislature next January. There were bills to make automobiles stop 8 feet from a street car; to require all owners to carry a liability policy of $3,000; to use some of the money from automobile fees to pay for guides for blind people; that number plates should be sent by parcel post; that chauffeurs be examined as to their eyesight; to change the law for registering operators; to regulate the sale of second-hand cars; to require a different truck registration; to have all cars used for hire take out a $3,000 insurance; to change the speed limit.

30-Mile Bill Killed

These were all heard by the Committee on Roads and Bridges. They were all thrown out except a speed bill. This was to change the law from the reasonable and proper definition at present to one calling for a flat 25-mile-an-hour speed. When it was argued some of the motorists said that if any change were made that the least it should be was 30 miles. The committee reported a 30-mile bill, but made no great effort to have it passed. It was killed in the Senate. Senator J. W. Haigis, who was chairman of the committee, has been thanked by the Bay State A. A., and asked to extend this thanks to the committee for the organization for its fairness to the motor industry.

Joint Judiciary Committee had a bill to place chauffeurs under the workmen's compensation law, but it turned it down. The Social Welfare Committee reported a bill to allow prisoners to work on the State highways. Mercantile Affairs Committee had the jitney bus bills and it reported one that was far different from that asked for by the street railway association. So the motorists have every reason to be thankful for what they received at the legislature's hands this year.

COLUMBUS, O., April 5—The Terrell bill pending in the Ohio House of Representatives, making the owner of an automobile prima facie responsible for damages caused by accident, no matter who drives the car, was defeated by an overwhelming vote last week. Only twenty-nine votes for the measure were secured in the house.

DETROIT, MICH., April 2—A petition for dissolution was filed in the circuit court today by the Metal Products Co., whose plant, buildings and machinery were purchased by the Timken-Detroit Axle Co., in March. All the assets of the metal company have been sold to the Timken company, the entire capital stock of the concern being given as $478,500 with no incumbrances.

DETROIT, MICH., April 5—The Union Trust Co., which has acted as temporary receiver for the bankrupt Benham Mfg. Co., which made the Benham cars, has filed a petition asking for the dissolution of that company, in the interest of the stockholders.

Another Process for Cheaper Gasoline

Kansas City Man Claims 10,000 Gallons of 30 Gravity Can Be Converted Into 11,900 Gallons of 65

KANSAS CITY, April 7—A local man claims to have an electro-chemical process which will make it possible to market gasoline at a profit at 3 cents a gallon. He is Louis Bond Cherry, 15 West Thirty-first street. His process converts low gravity oils into high grade gasoline. Local chemists state that undoubtedly he has a process that will cheapen the cost of gasoline, although to what extent they are unable to say. Mr. Cherry says his company already is formed for the production of gasoline.

To a represenative of THE AUTOMOBILE Mr. Cherry said, "Ten thousand gallons of 30 gravity distillated can be converted by this process into 11,900 gallons of 65 gravity gasoline. All of the volatile parts of the crude oil are turned into gasoline at any desired gravity and it takes less than 1 cubic foot of natural gas to a gallon of gasoline produced and not to exceed 5 kilowatts of electricity for the conversion of 10,000 gallons of crude oil a day. This will make the cost of conversion less than .75 cent a gallon."

Cornell Student Branch of S. A. E. Opened

NEW YORK CITY, April 3—At the first meeting of the Cornell Student branch of the Society of Automobile Engineers, there were about sixty-five students present, over forty applying for membership in the branch. It is expected that this will increase to 100 before long. The following officers have been elected: Honorary Chairman, Professor R. C. Carpenter; branch president, Lenox R. Lohr; branch vice-president, P. K. Linsey; branch secretary, H. A. Knight; branch recording secretary, N. W. Suiter; branch treasurer, S. Dewsnap.

INDIANAPOLIS, IND., April 6—*Special Telegram*—On account of a lack of quorum, the S. A. E. meeting, which was to have been held tonight, was postponed until May 11 when the members will discuss the constitution and by-laws with a view to standardizing them.

New Dealers' Organization in Milwaukee

MILWAUKEE, WIS., April 3—The Milwaukee Automobile Dealers, Inc., is the title of a new organization that has supplanted the Milwaukee Automobile Dealers' Assn. The association comprises practically every dealer in Milwaukee and the charter membership is thirty-two.

President, Frank J. Edwards; vice-president, George W. Browne; secretary, Jesse A. Smith; treasurer, John G. Wolleager; assistant secretary and manager, Bart J. Ruddle.

Headquarters have been established on the second floor of the new Hotel Wisconsin, in the heart of the downtown business section. Here the association will meet not only dealers, but automobilists from everywhere, and provide them with touring and route information, maps, etc.

A progressive motor show is a plan which the new association will carry out. On April 17 and 18 each of the thirty-two members will conduct special displays and exhibits in their salesrooms, and enough cars will be provided to transport all visitors and guests to the exhibits.

RACINE, WIS., April 5—The L-P-C Motor Co. announces that it is prepared to furnish the Vulcan electric gearshift, made by the Cutler-Hammer Mfg. Co., Milwaukee, Wis., on the Lewis six at an additional cost of $150.

NEW YORK CITY, April 7—H. Kerr Thomas, assistant manager of the Pierce-Arrow Motor Car Co., and a member of the Commercial Vehicle Committee of the N. A. C. C., will deliver a paper whose title is "Can A Standard Load Rating Be Devised and Approved by the Manufacturers?" at the third truck convention of the N. A. C. C. at Detroit, May 5 and 6.

Hermann Small Eight for Light Cars

DETROIT, MICH., April 6—The Hermann Engineering Co. has produced a small eight-cylinder motor of 2 1-2-inch bore by 4-inch stroke. This little eight follows the general lines of the maker's well-known four-cylinder motor. The connecting-rod bearings are placed side by side on the crankpins, and the camshaft is of the sixteen cam variety. Valves are operated directly without the use of rockers. Cooling is by thermo-syphon and lubrication splash from troughs placed beneath the crankpins. Valves are rendered accessible by the use of a detachable cylinder head.

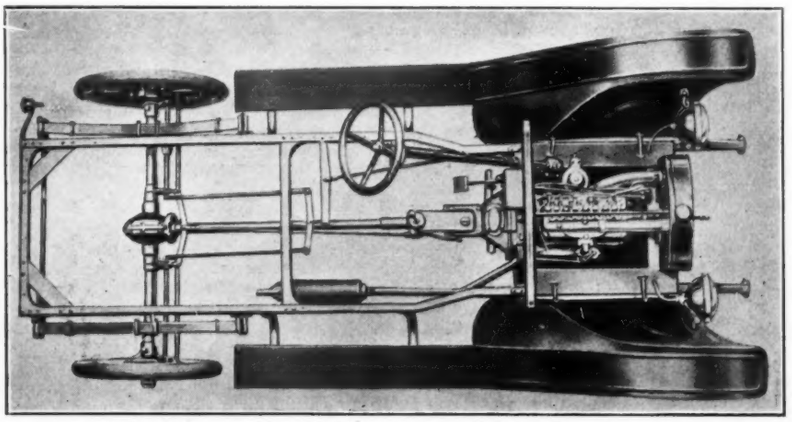
NEW YORK CITY, April 7—At the annual meeting of the stockholders of the Studebaker Corp., held in Jersey City yesterday, the retiring board of directors was re-elected. Nothing was said concerning the declaration of a dividend on the company's common stock. The directors are: J. M. Studebaker, chairman; E. R. Benson, F. P. Delafield, A. R. Erskine, F. S. Fish, Henry Goldman, J. G. Heaslet, A. B. Hepburn, W. R. Innis, H. H. Lehman, Philip Lehman, N. J. Riley, G. M. Studebaker, G. R. Turner and D. M. F. Weeks.

NEW YORK CITY, April 3—In the description of the four new United Motor truck models which appeared in THE AUTOMOBILE for March 25, it was stated that the 2-ton truck has a 148-inch wheelbase. This should have been given as 144 inches. The tires on this model were given as 34 by 4 front and 36 by 4 dual rear; whereas, they are 36 by 4 front and 36 by 4 dual rear. The standard wheelbase of the 5-ton model was given as 120 inches, which should have been 144. It was also stated that Frank T. Hulswit, president of the company, is president of the local railway and light company. Mr. Hulswit is president of the United Light and Railway Co.

Lima Light Car to Sell for $500

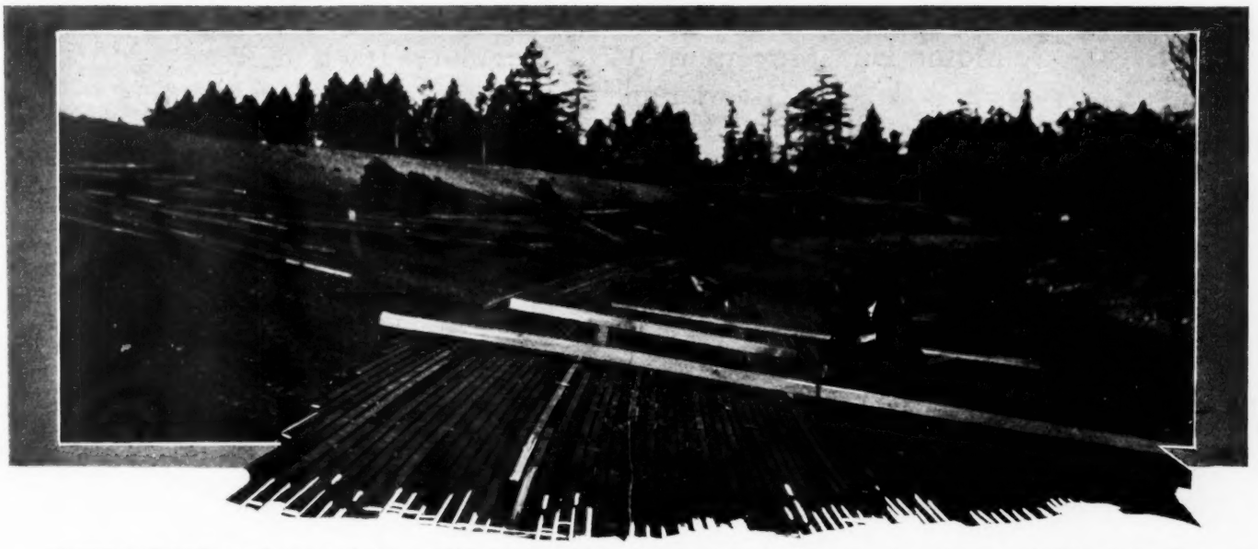
LIMA, O., April 5—The Lima Light Car Co., organized with a capital of $50,000, has announced the Lima light car to be produced at the rate of ten a day as maximum for the present. The chassis is a simple standard shaft-drive type and the car will be made in three body styles, speedster, roadster and light delivery wagon. The four-cylinder block valve-in-the-head motor is rated at 18 horsepower and forms a three-point suspended unit power-plant with the leather-faced spring insert cone clutch and three-speed gearset. Atwater Kent ignition is used. Both brakes are equalized and electric lighting is standard equipment. Wheelbase is 100 inches and tires 28 by 3. Cooling is by thermo-syphon. Springs are semi-elliptic all around and rear axle is semi-floating. Left drive and center control are standard. Equipment includes lamps, electric horns, tools and tire repair outfit and the car sells for $500. Top, windshield and speedometer are $50 extra. The radiator used is extra large with Dippert patent tubes. Steering gear is worm and sector, irreversible.

Officials of the company are: I. J. Miller, president; C. E. Miller, vice-president; and A. C. George, secretary, treasurer and general manager. Experimental cars have been tried out.



Chassis of Lima light car which, as runabout, speedster and light delivery, sells for $500

Rapid Progress in Planking Tacoma's 2-Mile Speedway



TACOMA, WASH., April 2—As stated in THE AUTOMOBILE this week, the Tacoma Speedway Assn. is planking its 2-mile speedway. About 2,500 feet has been completed in the past week, the width being about 18 feet. The illustration shows one of the curves, there being four of these on the course, each with a radius of 890 feet and all banked on the outside to the height of 18 feet and in place of being banked on a straight line there is a ditch of about 2 feet from top to bottom on each curve, making it practically impossible for a car to leave the track on the turn even at the highest speed. All of the intersections of the track will be filled with small gravel after which the entire surface will receive a thin coating of asphaltum oil and sand. This will prevent skidding and give a smooth, uniform surface. The contract specifies that the course must be completed by June 1

Indiana Speedway Is True to A. A. A.

Attempts to Induce Rupture Unsuccessful, Says Director—Burman Defeats Cooper and Disbrow—Other Racing News

NEW YORK CITY, April 7—Attempts to influence the Indianapolis Motor Speedway to break away from the American Automobile Assn. control by the recently organized racing association in southern California are apparently meeting with little success, according to a bulletin issued today by the American Automobile Assn., which quotes as follows from a director of the Indianapolis speedway, in which it is stated that the speedway stands firm for A. A. A. control. The director said: "The Indianapolis Speedway believes that the only safe way to control racing from the point of view of protecting the public is through the impartial, sportsmanlike, administration of a disinterested body like the A. A. A. As long as the speedway endures we shall give our support to the A. A. A. and we hope the support will never fall into the control of various local, organizations who will run things practically as they please."

Three Maxwells Enter Chicago Race

CHICAGO, ILL., April 5—The entry of the three Maxwells for the Chicago speedway race on June 19 is announced by Contest Director F. E. Edwards, bringing the total number of declarations up to eleven—three Stutzes, de Palma's Mercedes, two Sunbeams, a pair of Duesenbergs and the three Maxwells. The Maxwell drivers are not named.

Burman Defeats Cooper and Disbrow

LOS ANGELES, CAL., April 4—*Special Telegram*—Driving his rebuilt Peugeot, Bob Burman defeated Disbrow in a Simplex and Earl Cooper in a Stutz in the three-cornered 50-mile match race at Ascot Park today. Cooper finished second, almost two laps behind Burman. Disbrow broke a drive chain on his twenty-first lap, losing three laps. Again on his thirty-fifth lap he broke another chain and retired.

Burman's time for the half-century was 52:36.9 and Cooper's 53:46.45. The poor condition of the track was responsible for the slow time. Cooper began to lose from the start and at the end of ten laps was 1-2 mile in the rear. On the seventeenth Burman lapped him and on the twentieth Disbrow passed him but broke down the next time around.

INDIANAPOLIS, IND., April 5—John de Palma, a brother of the road racing champion, will have a mount in the 500-mile race on the local speedway. Upon him will devolve the task of piloting the Delage, which won the 1914 sweepstakes with Rene Thomas at the wheel. John de Palma has been selected by W. E. Wilson, who now owns the Delage, to represent him, and the entry was filed today.

Suggests Stock Cars for 1,000-Mile Race

INDIANAPOLIS, IND., April 6—A 1,000-mile race at the local speedway among the winners of the 500-mile international sweepstake contests, but limited to the registered stock touring car models of these makes, is proposed by Walter Marmon, president of the Nordyke & Marmon Co. Mr. Marmon's idea is to have each of the factories, Marmon, National, Peugeot, Delage and the winner of the 1915 race, provide regular stock touring models which would carry no extra racing fittings. Let each car be raced with top and windshield up, carrying five passengers, with electric lighting and starting equipment and tools and everything that a man expects to have on his car on a touring trip with the exception, perhaps, of the luggage for the passengers. Then run the race at 1,000 miles on the Speedway for a purse of $100,000.

NEW YORK CITY, April 7—Application has been made to the A. A. A. for a sanction to hold automobile races on the afternoon and evening of June 12 at Brighton Beach. The Brighton Beach Motordrome management, which is promoting the race, plans to illuminate the track with powerful electric and gas lights at night.

NEW YORK CITY, April 7—F. W. Stelle was yesterday elected trustee in bankruptcy of the Twombly Car Corp. of 1790 Broadway, with a bond of $5,000. D. D. Sherman was elected trustee for the Twombly Motors Co., the Twombly Power Co., and the Twombly Taxicab Co.

Developments in the Jitney Bus Field

Motor Bus Movement Will Regulate Itself if Given Fair Chance

THE jitney bus question is likely to regulate itself in a short time, in the opinion of the National Automobile Chamber of Commerce, without any attention from legislators and city councilmen, if given a chance. The eagerness with which the public has taken to riding in the buses shows that they fill a need in local transportation. Patient citizens long ago grew weary of strap-hanging and will not see promised relief snatched from them without a protest.

Eventually, in the opinion of the chamber, the jitney will be succeeded by especially built motor omnibuses, like those operating in the largest European and American cities. Their real function will be to supplement the street car service, which is insufficient in most large cities, and to this end the public will demand that their development along proper lines be not discouraged.

Jacksonville Trolley Co. Installs Automobiles

JACKSONVILLE, ILL., April 3—In order to head off any possible jitney competition, the Jacksonville Street Railway company has installed automobiles to operate from the terminus of the trolley line to Diamond Grove Cemetery, accepting transfers from the street cars. The automobiles will operate hourly temporarily. Should the experiment prove successful, additional service will be installed to other points not reached by the street cars. L. F. O'Donnell, owner of an automobile, is also planning to install a jitney service between the square or business district, and the depots.

To License Common Carriers in Lansing

LANSING, MICH., April 1—At a meeting of the city council the new jitney bus ordinance was read. It will probably be passed at the next meeting, the matter of the amount of bond being as yet undecided.

The ordinance provides that any person in the business of a common carrier of persons, using for that purpose any carriage, cab, coach, coupé, omnibus, taxicab, jitney bus, automobile, sleigh or any other vehicle for hire, must obtain a license from the city clerk. The license will cost $10 for the first vehicle and for each additional vehicle $5.

The driver or owner of the vehicle may make the following charges: from 6 a. m. to 11 p. m. for a distance not exceeding 1 1-2 miles by the most direct route, the sum of 25 cents per passenger and for a distance greater than 1 1-2 miles, 50 cents per passenger. Between 11 p. m. and 6 a. m. double fare may be asked. No charge for children under 6 years when accompanied by a paying passenger and for children of 6 to 12 years only half the fare is to be charged when accompanied by a paying passenger. Passengers have a right to carry free of charge baggage not weighing more than 50 pounds, while for excess weight there may be charged 25 cents. A vehicle may be used by the hour and for one carrying four or less passengers a charge of $1.50 may be made for the first hour and 1 dollar for each additional hour or fraction thereof, these rates being doubled between 11 p. m. and 6 a. m.

In the ordinance a bond of $1,000 for one vehicle is proposed and a bond of $2,000 for two or more vehicles.

GRAND RAPIDS, MICH., March 30—The local jitney bus owners have formed a temporary organization, W. D. Vandecar, distributor for the Reo and Premier cars, being elected chairman, and C. H. Lillie, secretary. When the first meeting adjourned sixty-two owners were on the membership list.

The principal matter discussed at the meeting was relative to liability. It was stated by several owners of single cars that when they first tried to get liability insurance the rates quoted were from $27 to $34 for a $5,000 policy to cover liability for injury to a single person, but since then the rate has been increased to $100, which is prohibitive.

$9.23 Per Day Given as Jitney Bus Cost

SAN FRANCISCO, CAL., April 2—It costs $9.23 a day on an average to run a jitney bus, according to P. V. Marshall, principal of the Y. M. C. A. Automobile School. He has it figured down to a nicety. He estimates that the cost of operating for 300 days a year, 12 1-2 hours a day, a jitney bus costing not more than $600 when it was new will be about as follows:

	Per Yr.
Six per cent. interest on one-half of $600, investment	$18.00
Insurance	192.00
Depreciation	300.00
Storage	120.00
Driver's wages ($100 a month)	1,200.00
Licenses	28.00
Jitney association dues	12.00
Yearly fixed charges	$1,870.00
Average for 300 days per year	$6.23
Oil, gasoline, grease, etc	1.50
Tires (150 miles at ½c.)	.75
Mechanical upkeep, repairs, etc	.75
Daily cost	$9.23

"If you start with a new bus car," says Marshall, "one which costs approximately $600, you must take in $9.23 a day or subtract the difference from your wages, $100 per month. This is little enough for driving a jitney 150 miles a day. If your car is second-hand or cost more than $600 when new, or is heavier than a $600 car, you must of course, estimate higher daily cost figures."

MILWAUKEE, WIS., April 5—Milwaukee's jitney industry is still in a thriving condition and getting better every day. On April 3 the total number of jitney licenses issued was 237 and the daily average issue is fifteen. Until May 1 the fee will be $5, as for a 1-2 year, and after that date the annual fee of $10 will be charged, licenses being good until May 1, 1916. The licenses are the same as for any "for hire" vehicle and are not special grants for jitney buses.

One of the most pressing problems for the jitney owners as well as the jitney passenger is the question of insurance. Insurance agents are plying their home offices with questions as to the liability for injury while riding in jitney buses. Jitney owners are wondering what the consequences will be if they are struck or strike another. And the passenger is wondering how and from whom they would be able to collect damages in case of accident. Few, if any, jitney buses carry liability insurance, the rate being considered altogether prohibitive.

About 150 jitney operators have organized as the Independent Jitney Assn. and chosen a business agent with downtown headquarters. The association proposes to settle the matter of insurance by mutual liability unless the insurance companies reduce their premium rates.

GRAND RAPIDS, MICH., March 30—The village council of East Grand Rapids, has passed an ordinance requiring a license fee of $60 per year from jitney bus owners and a liability insurance bond of $10,000 to protect passengers, pedestrians or the village against accidents. The cars and chauffeurs must be licensed.

Pay-As-You-Enter Jitney in Baltimore

BALTIMORE, MD., April 3—The jitney bus service continues to thrive in Baltimore and in the past few days several new lines have been started. Among the latest is a pay-as-you-enter affair fitted up with a signal bell for the passengers to ring when they want the vehicle to stop.

The police of Baltimore have started taking a census of all the jitney buses in the city. So far they have found

thirty-five different lines, but more are entering the field so fast they are having trouble in keeping up with them.

A great deal of interest is being taken in the proposed bus line plying between this city and Washington. It will touch Halethorpe, St. Denis, Elkridge, Dorsey, Waterloo, Savage, Laurel, Muirkirk, Ammendale, Beltsville, Branchville, College Park and Hyattsville, starting at the Hotel Emerson in this city and ending at the Hotel Willard in Washington. The fare will be 75 cents each way. Forty-horsepower buses will be used with a capacity for twenty-six persons. They will weigh approximately 7,500 pounds.

The local authorities and those of the District of Columbia have been asked to grant permission for the operation of the line. It will begin within the next 2 weeks, it is said.

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Providence Jitney Assn. Is Formed

PROVIDENCE, R. I., April 3—At a meeting last week a number of owners of jitney buses in Providence formed the Rhode Island Jitney Bus Association with a charter membership of more than thirty. The following officers were chosen: Jerome Gaudet, president; E. J. Corbett, secretary; James H. McNiff, treasurer.

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PORTLAND, ME., April 3—The second jitney bus line has been put in operation in Portland and now runs to Deering Centre and return. Another line will be run to Westbrook, and a fourth is planned for the Summer parks in South Portland. One of the local dealers is planning to run a number of the buses to the ball park and back during the Summer season.

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Two Jitney Concerns in Hamilton Ont.

HAMILTON, ONT., April 3—Two jitney companies have been started in this city, one of which is already in operation while the other has just been capitalized. The Hamilton Jitney Service Assn. came into being this week when articles of partnership were drawn up by A. A. Decker and C. M. Wilson as an operating company for a jitney service through the principal streets of the city. C. W. Bell is acting for the association and the company works in conjunction with the owners of automobiles. The other concern is the Hamilton Jitney Co. which has been incorporated at $40,000. The purpose of this company is to own and operate automobiles in Hamilton as a livery service. The following men are behind the proposition, A. Carey, F. W. Reinke, L. H. Allen, E. S. Carey and C. V. Langs.

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HARTFORD, CONN., April 3—After due investigation and full consideration Hartford has at last come to the jitney way of thinking. Early in the week one audacious spirit announced what he termed the blue line operating from West Hartford center to city hall, a distance of about 3 miles. An Overland touring car is used for this service. The success of this venture has emboldened others to try the experiment. Coincidental with the blue line which operates along the route of the West Hartford trolleys is the red line which traverses Franklin avenue. This is also a 5 cent line. Still another line operates over the Cedar Hill route and from all reports is not wanting in custom. The north end of the city is also covered. The first suburban jitney is that operating between Hartford and South Manchester, for which ride 15 cents is charged.

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LOS ANGELES, CAL., March 29—The jitney bus situation has assumed a new phase in Los Angeles. A member of the mounted traffic squad tied tags on fifteen or twenty jitneys standing on Hill street between Fifth and Sixth streets yesterday, ordering the owners to appear in police court for violation of Section 7 of the traffic ordinance. This section makes it unlawful for the owner or driver of any "for hire" vehicle to stand upon any street in the business district unless such person shall have procured a permit in writing for such privilege from the Board of Police Commissioners.

The Auto Bus Owners' Assn. attorneys claim that if the jitney men are to be prosecuted for violation of Section 7 of the traffic ordinance, the city can not collect more than $7.50 per quarter, the license fee for rent machines that occupy stands.

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350 Jitneys in Vancouver, B. C.

VANCOUVER, B. C., April 5—Consul-General Mansfield at Vancouver, in a report on jitney operation in that city, says that they made their first appearance about January 1, 1915, and about 350 are now being operated. Average daily receipts of each jitney are reported at $8.00 and the traffic of the British Columbia Electric Railway has been severely affected. In January, 1915, the railway company carried 1,138,333 fewer passengers than in January, 1914, when the number of passengers carried was 3,364,062. In January, 1914, the company paid the city $2,766 as its percentage of the gross receipts of the railway, while in January, 1915, this payment was but $1,816 a decrease of 33 1-3 per cent. It is estimated that the city will lose $30,000 in these payments if the present decrease in the electric railway receipts is maintained.

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LOS ANGELES, CAL., March 30—A bus line into Griffith Park has been projected by the city council of Los Angeles. Owing to a freak charter provision, no electric railway may run its line into the park and the motor bus is the next best thing and will operate until the time comes when a railway line may legally be constructed to accommodate the visitors to the park.

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OTTAWA, ONT., April 2—The first jitney has made its appearance locally and if successful it is expected within a few weeks all the main and suburban lines will be covered.

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JOLIET, ILL., April 5—In order to secure transportation facilities to Forest Park, not reached by the street cars, a jitney bus service is to be inaugurated shortly. The line will be operated upon the co-operative plan, shares being sold at $5 each. If there is any profit, it will be divided among the stockholders.

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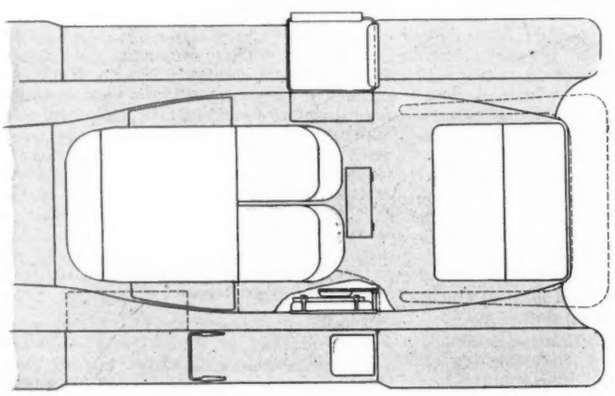
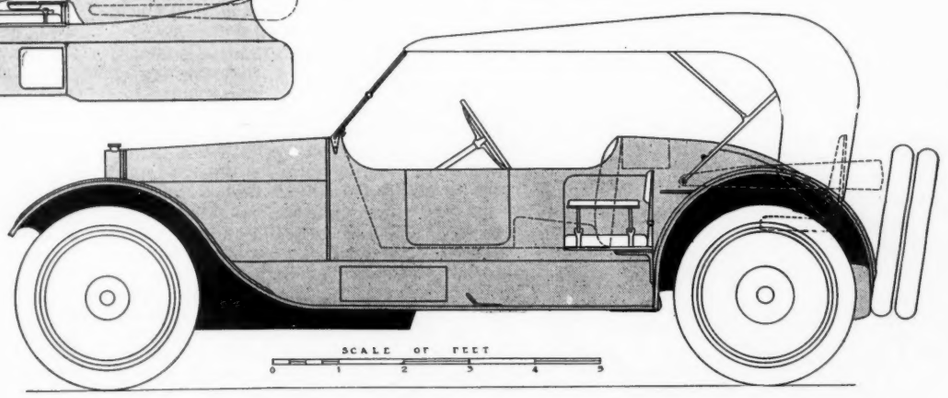
CAMDEN, N. J., April 3—Three lines of jitney buses began operation in this city starting March 29.





Six-passenger roadster body now building for a Chandler six chassis. Four passengers are accommodated within the body and the other two can sit on disappearing seats that can be set up on the running boards. With raked windshield the car will have an exceptionally smart appearance, unique for a car of this capacity

Factory Miscellany

DAYTON Engineering to Add—The Dayton Engineering Laboratories Co., Dayton, O., has authorized the erection of another large addition to the plant. The new structure will be 500 feet long, 66 feet wide and six stories high. The company employs approximately 1,700 men. The officers of the company are: E. A. Deeds, president; C. F. Kettering, vice-president; G. F. McCann, secretary-treasurer. Other directors are B. F. McCann and W. H. Chryst.

Hood Rubber to Add—The Hood Rubber Co., Watertown, Mass., plans to construct an addition to its plant in that city.

Hudson's Windsor Plant—The Hudson Motor Car Co., Detroit, Mich., plans to establish a branch factory at Windsor, Ont.

Polson to Add—The Polson Mfg. Co., manufacturer of automobile tops and windshields, plans to build an addition to its factory at Chenango street, Buffalo, N. Y.

Regal Adds to Berlin Plant—The Regal Automobile Co., Detroit, will make an addition to its factory in Berlin, Ont., and will require machinery. Mr. Nyberg is branch manager.

Detroit Foundry Sale April 9—The machinery, tools and foundry supplies of the bankrupt Detroit Foundry & Mfg. Co., Detroit, Mich., will be sold at public auction at the plant, 1218 Hastings street, at 10 a. m., April 9.

Remy to Build—The Remy Electric Co., Detroit, Mich., obtained recently a construction permit for various structures, which will cost $96,075. A two-story plant, 60 by 50 feet, will be erected on East Grand boulevard, between Beaufait and Mount Elliott.

Work Started on Williams Plant—Work has been started in the erection of a large factory at Vista Station, Irwin, Pa., for the manufacture of automobile tires and other rubber goods by the Williams Tire & Rubber Co. Five hundred men will be employed.

Detroit Body Co. Adds—A permit for a three-story addition, 55 by 110 feet, has been obtained by the Griswold Motor Body Co., Detroit, Mich. When completed it will mean 55,000 square feet of additional floor space or an increase of 60 per cent. over what the concern now has.

Progress Auto Parts Co. Opens.—Herman Hersch and Harry Greenberg have organized the Progress Auto Parts Co., Cleveland, O., doing a general jobbing business in automobile parts and accessories, specializing in purchasing parts of discontinued cars and regular stocks.

Havers Equipment for Sale—Motor car manufacturing machinery, shop equipment, automobile parts and accessories from the bankrupt Havers Motor Car Co., Port Huron, Mich., are now for sale either at the plant or at the offices of the Harris Bros. Co., Jefferson avenue, Detroit which purchased the entire stock.

Harrison Radiator Enlarges—The Harrison Mfg. Company, Lockport, N. Y., manufacturer of radiators and accessories for automobiles, is preparing to build an extension to its plant, and will probably let the contract within a few days. It will not require any additional machinery. H. C. Harrison is president.

Buys Detroit Foundry Plant—The Peninsular Smelting Co., has purchased the plant of the old Detroit Foundry & Mfg. Co., 1218 Hastings street, Detroit, Mich., and will soon move there from its present location at 52 Baltimore avenue. The new plant which consists of a one-story brick building 90 by 165 feet, provides 11,000 square feet of floor space.

New Kelsey Wheel Plant—Construction work will be started shortly on a new one-story brick and steel building, 90 by 313 feet, for the Kelsey Wheel Co., Detroit, Mich. When completed the total floor space of the company, including its plant in Memphis, Tenn., will aggregate more than 205,000 square feet. The new structure, which will cost $50,000 will be used for stamping purposes.

Hayes Body at Full Capacity—During the last 2 months business has been better than at any other time during the last 3 years, according to a report by an officials of the Hayes-Ionia Co., Ionia, Mich., automobile body makers. About 425 men are now working, which means that the plant is operated to its full capacity. Between eighty and eighty-five is the average daily output, and this will be gradually increased if possible.

Ford Tire Plant in Findlay—The Toledo-Ford Tire Co. has announced its main factory will be located in Findlay, O., and that preparations are being made to erect a 50 by 400-foot addition to the present factory on Lima avenue. The company has taken out a building permit to construct a $1,500 boiler house. The plant will be in operation within the next 3 weeks.

Parrett Tractor Moves Plant—The Parrett Tractor Co., which was organized by James Parrett and sons, Dent and Henry, moved the Ottawa (Ill.) plant to Chicago Heights April 1. The Ottawa quarters are somewhat limited, and it has been found that the machines can be manufactured more economically in a large shop, already in operation, and adapted to any kind of machine construction. Dent Parrett, president of the company, will have his headquarters at 409 Fisher Bldg., Chicago.

Superior Co. May Enlarge—The Superior Mfg. Co., Ann Arbor, Mich., which originally manufactured only gasoline lighting systems, but which for some time has been making automobile windshields, is rapidly developing this part of its business to such an extent that it may be necessary to enlarge the plant. President H. H. Seeley reports having orders for 50,000 windshields for the Buick Motor Co., Flint, Mich.; 50,000 for Dodge Bros., Detroit, besides receiving the orders for the entire output of the Reo Motor Car Co., Lansing, Mich., and the Chalmers Motor Co., Detroit.

Maxwell Force Increases 5,930—At the end of February there were 13,291 men on the pay-roll of the different plants operated by the Maxwell Motor Co., Detroit, Mich. This shows an increase of 5,930 men as compared with February, 1914. In February of last year the office forces totaled 506 while this year the number was 936. W. E. Flanders, president of the Maxwell company, has arrived in Dayton, O., from Detroit, and announces that work on the duplication of the factory in North Dayton will be started at once. The construction will be of brick and will conform with the present factory. Employment will be given to 400 additional workmen.

Schlieder Valve to Build—A new plant will be erected at East Grand boulevard and Oakland avenue for the Schlieder Mfg. Co., Detroit, Mich., which makes automobile valves. The structure will be partly two stories high and cover a piece of ground 80 by 135 feet. The new plant will provide 14,800 square feet of floor space, or over 50 per cent more than now available. Recently a 400 per cent stock dividend was declared to provide for the increase of the capital stock of $100,000 The annual output has increased from 12,000 valves to over 100,000. The stockholders are: A. E. Schlieder, president; H. F. Osborn, secretary-treasurer, and W. F. Spath, chief inspector. The entire output for 1916 has been contracted for, said President Schlieder.

The Automobile Calendar

April 5-10	DuBois, Pa., Show, Moose Hall.
April 7-10	Calumet, Mich., Show, Coliseum Rink.
April 16	Manchester, Eng., Show, Ice Palace, North of England Motor Shows, Ltd.
April 20-22	Oklahoma City, Okla. Road Race, S. W. Auto Racing Assn.
May 15-16	Columbus, O., Track Race, Columbus Automobile Club.
May 17	Spokane, Wash., Show, Davenport Hotel.
May 17-18	Boston, Mass., A. A. A. Annual Meeting.
May 27	Chicago, Ill., Sociability Run of Chicago Motor Club to South Bend, Ind. H. H. Robinson.
May 29	Indianapolis, Ind., 500-Mile Race, Indianapolis Motor Speedway.
June 9	Galesburg, Ill., 200-Mile Race, Galesburg District Fair Assn.
June 19	Chicago, Ill., 500-Mile Race, Chicago Speedway.
July 3	Sioux City, Ia., 300-Mile Race, Sioux City Speedway Assn.
July 4-5	Tacoma, Wash., Road Race.
July 5	Omaha, Neb., Speedway Races, Omaha Motor Speedway.
Aug.	Milwaukee, Wis., Independent Petroleum Marketers' Assn. of the U. S.; 1915 Convention in Milwaukee.
Aug. 2-3	San Francisco, Cal., Tri-State Good Roads Assn., Third Annual Convention.
Aug. 20-21	Elgin, Ill., Road Race.
Sept.	Indianapolis, Ind., Fall Show, Indiana State Fair.
Sept. 20-25	San Francisco, Cal., International Engineering Congress.
Oct. 6-16	New York City, Ninth Electrical Exposition and Motor Show at Grand Central Palace.

The Week in the Industry

Motor Men in New Roles

CROOKER Regal Advertising Mgr.—R. H. Crooker, during the past 2 years with the advertising department of the Burroughs Adding Machine Co., has been appointed advertising manager of the Regal Motor Car Co., Detroit, Mich.

Snarr Wesco Sales Mgr.—G. W. Snarr of the Wesco Supply Co., St. Louis, Mo., has been advanced to the position of manager of automobile accessory sales.

Armstrong Bowser Detroit Mgr.—W. A. Armstrong has been appointed manager of the local branch of S. F. Bowser & Co., Detroit, Mich., gasoline tank manufacturers.

Graham Perkins Purchasing Agent—G. M. Graham, designing engineer of the Massnick-Phipps Mfg. Co., Detroit, Mich., maker of the Perkins four and eight cylinder motors, has been made purchasing agent.

Kennedy Resigns—L. E. Kennedy has resigned as secretary, treasurer and general manager of the Western Brass Co., Milwaukee, Wis., and returned to Burlington, Wis., his former home, to engage in business on his own account.

Gewinner Marathon Representative—H. J. Gewinner has been appointed by the Marathon Tire & Rubber Co., Cuyahoga Falls, O., as its Southeastern representative. His headquarters for the present will be at Birmingham, Ala.

Ellis Beaumont Cadillac Mgr.—H. D. Ellis has been appointed manager of the Beaumont, Tex., office of the Cadillac company to succeed George DeWitt, who has been appointed to look after the Cadillac interests in the Cotton Belt section of the state.

Berger Joins Lozier—L. B. Berger, who was with the Willys-Overland Co., having charge of the sales of the Willys-Knight at the Garford plant, in Elyria, O., has resigned to join the Lozier Motor Co., Detroit, Mich., where he now has charge of the sales department.

Britt Buys Out Business—R. H. Britt, who had been in the automobile business in Mexico for 2 years, returned to Springfield, Mass., a short time ago and now he has bought the Springfield Auto Top & Upholstering Co. from W. H. Shinks, and will continue the business at 42 Harrison avenue.

Wentdorf Succeeds Bremer — The Standard Aluminum Co., Two Rivers, Wis., announces the retirement of William Bremer as president and the succession to the executive position of Herman Wentdorf, until now secretary and treasurer. Louis Gloe has been elected to succeed Mr. Wentdorf. The company built a large rolling mill at its plant a year ago and several weeks ago increased its capital stock to better accommodate its growing business.

Dawe Heads Steel Treating Club—C. N. Dawe, metallurgist of the Studebaker Corp., Detroit, Mich., was elected president of the Steel Treating Research Club, at the annual meeting. C. R. Poole, chemist and metallurgist of the Frost Gear & Forge Co., Jackson, Mich., was elected secretary. The club's members are chemists, metallurgists and hardening room foremen of the plants in Michigan. Associate membership is open to representatives of manufacturing concerns whose products are connected with heat treating departments.

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Garage and Dealers' Field

Dayton Rubber Branch Moves — The Chicago, Ill., branch of the Dayton Rubber Mfg. Co. has moved to 2011 Michigan avenue.

McGraw Tire Branch in Buffalo—The McGraw Tire & Rubber Co., East Palestine, O., has opened a branch store at 737 Main street, Buffalo, N. Y.

Pyrene's N. Y. Offices Moved—The Pyrene Mfg. Co. has moved its offices to the Vanderbilt Concourse Bldg., 52 Vanderbilt avenue, corner East 45th street.

Braender Opens Trenton Branch—The Midler Auto Supply Co., 7 North Montgomery street, Trenton, N. J., has been appointed distributor for Braender tires.

Burd Executive Offices Moved — The general and executive offices of the Burd High Compression Ring Co., Rockford, Ill., have been moved to 307-309 South Main street.

Studebaker Commercial Sales Good—The Studebaker Corp., Detroit, Mich., during the first week in March, 1915, sold through its commercial car department, fifty-one vehicles.

Kalamazoo Dodge Moves—The salesroom and garage of H. J. Cooper, Kalamazoo, Mich., agent for the Dodge cars, has been moved from 420 West Main street to 107 North Church street.

Bachem Moves—Max Bachem, distributor in Detroit, Mich., of the Gabriel snubbers, Ritz-Woller gasoline gauges, and the Bachem pressed steel wheels, has moved to 1235 Woodward avenue.

Frisco Bosch Moves—The San Francisco, Cal., branch of the Bosch Magneto Co., has moved to larger quarters, from the lower end of Van Ness avenue to the upper end of the boulevard in the center of the automobile section. B. R. Miller is manager.

Takes Philadelphia Batavia Branch—Franklin Kesser has taken over the business of the Philadelphia (Pa.) branch of the Batavia Rubber Co. and will conduct an agency for eastern Pennsylvania and southern New Jersey. Headquarters are at 844 North Broad street.

Goodyear's Western Managers Meet—Branch and district managers of the Goodyear Tire & Rubber Co. in Washington, Oregon, Montana, and California, attended a conference in Seattle, during the past week. The meetings were presided over by M. E. Morris, manager of the Pacific Coast interests with headquarters in San Francisco.

Takes on Van Speedometer—The Cutting & Smith Sales Co., 997 Woodward avenue, Detroit, Mich., which is distributor for automobile components and accessories, has completed a deal whereby the Van speedometer will be handled by the company in the states of Michigan, Ohio and Indiana. The Van is manufactured by the Van Sicklen Co., Aurora, Ill.

Electric Garage for Baltimore—The Electric Service Garage Co., Baltimore, Md., plans to build a central garage for electric trucks and automobiles. An option has been obtained on a lot at Calvert street, near Centre. A two-story garage, 150 by 200 feet, will be built, to be opened about June 1. A machine shop and a battery department will be installed.

New Accessory Firm in Spokane—The Automobile Accessory Agency opened in Spokane, Wash., during the past week at 105 Riverside avenue. H. A. Holland is president; A. Phillips, vice-president; L. D. Holland, second vice-president, and A. E. Torelle, secretary and manager. A general retail and jobbing business will be conducted in automobile and motor supplies, and featuring the Goodrich line of tires.

Grand Rapids Dealers Organize—The automobile dealers of Grand Rapids, Mich., have organized the Auto Business Assn., the object of which is to bring about closer relationship between the dealers, with a view of obtaining more co-operation between dealers and owners for the development of the roads in western Michigan and securing more equitable legislation. R. E. Becker was elected president of the association.

Large Detroit Garage Opened—One of the biggest garages in Detroit, Mich., the Wolverine Garage Co., has opened for business. The owners are J. R. Gilbert, until recently manager of the local branch of the Pennsylvania Rubber Co., who is president and general manager, and A. T. Hamlin, who has been in the automobile repairing business during the last 12 years, having been connected with the Packard, Knox, Northway and several other big manufacturing concerns. The garage, which has 14,000 square feet of floor space, will be open day and night. It is located at 248 Jefferson avenue, East.

Convict-Made Trucks Sold—Five new motor trucks, manufactured by the convicts in the Ohio penitentiary at Columbus, were delivered to various state institutions last week. The five trucks were assembled inside the walls and represent an entirely new phase of prison labor which will probably be utilized in the future by the state officials. The idea of building motor trucks was at first regarded as impracticable but an experimental model constructed 6 months ago demonstrated that such trucks can be built. The cars were built under the supervision of an expert machinist. Each truck has a carrying capacity of 3 tons. They are provided with 35-h.p. Continental motors. Many of the parts were made entirely within the walls, including the bodies, gear-shift levers, muffler, frame and upholstering. The trucks will be sold to the state institutions for $2,500 each which will leave a small profit to the prison management.

Automobile Agencies Recently Established

PASSENGER CARS

Michigan

Detroit	Ohio	Ohio Electric Sales Co.
Detroit	Briscoe	Foster Motor Sales Co.
Dowagiac	Overland	L. C. Wells
Grand Rapids	Glide	F. P. Oswald
Grand Rapids	Remington	Remington Sales Co.
Holland	Jeffery	F. W. Jackson
Iron River	Case	Iron River Motor Car Co.
Jackson	Saxon	W. T. Murray
Kalamazoo	King	W. O. Harlow
Ludington	Saxon	Cartier Auto & Garage Co.
Manistee	Ford	Traverse Auto Co.
Manistee	Reo	Traverse Auto Co.
Marshall	Argo	O. L. Linn & R. S. Scott
Marshall	Briscoe	O. L. Linn & R. S. Scott
Marquette	Ford	E. W. Jones
Perry	Dodge	Dunning & Hart
Port Huron	King	F. S. Church
Saginaw	Argo	Electric Vehicle Service Co.
Saginaw	Borland	Electric Vehicle Service Co.
Saginaw	Broc	Electric Vehicle Service Co.

Minnesota

Anoka	Lexington	J. H. Ward
Lake Crystal	Case	W. R. Roberts
Lanesboro	Kissel	J. G. McMaster
Minneapolis	Davis	White Garage

Missouri

Kansas City	King	Karshner Motor Car Co.
Kansas City	Stearns-Knight	Scarritt Motor Car Co.
Maysville	Lexington	H. O. Williams
St. Louis	Lexington	Lindell Motor Car & Repair Co.
St. Louis	Davis	Cherokee Automobile Co.

Nebraska

Omaha	Davis	Wilson Auto Co.
Omaha	Stearns-Knight	McIntyre Automobile Co.
Omaha	Davis	Freeland Auto Co.

New Jersey

Burlington	Detroiter	M. J. Gray
Camden	Detroiter	O. O. Phillips
Elizabeth	Ohio	Elizabeth Auto Co.
Gibbsboro	Detroiter	H. Parker & Sons
Glen Ridge	Oldsmobile	Glen Ridge Auto Co.
Landisville	Detroiter	C. F. Riedel
Millville	Detroiter	Troth & Keen
Morristown	Oldsmobile	Cain-Henry Motor Car Co.
Mullica Hill	Detroiter	J. P. Stratton
Newark	Simplex	J. M. Quinby & Co.
Newark	Kissel	C. F. Briggs
Newark	Case	North Grove Garage Co., Inc.
Toms River	Detroiter	A. W. Brown
Trenton	Davis	F. P. Holz
Trenton	Detroiter	Toman Brothers
Woodstown	Detroiter	E. G. Peterson

New York

Albany	Simplex	Albany Garage Co.
Amenia	Saxon	Amenia Garage
Amityville	Case	Amityville Garage
Brier Hall	Case	A. D. Griffin
Buffalo	Case	C. R. Cool
Buffalo	Simplex	Simcott Motor Sales Co.
Buffalo	Apperson	Poppenburg Motor Car Co.
Ceres	Detroiter	Raymond & Lamphere
Colfax	Case	G. B. Carter & Son
Cortland	Case	C. M. Smith
East Hampton	Case	L. O. Edwards
East Port	Case	L. S. Tuttle
Ellicotville	Detroiter	J. E. Doolittle
Elmira	Detroiter	J. B. Bishop
Farnham	Detroiter	C. J. Peters
Flushing	Case	D. L. Rapalje
Greenport	Case	J. Kluge
Grantsville	Case	J. R. Eliason
Hempstead	Case	National Garage Co.
Hicksville	Case	C. A. Reinhard
Hillsboro	Case	Richard Brothers
Islip	Case	Gates Auto Garage
Kenoza Lake	Saxon	Thiess & DeLap
Livonia	Detroiter	Scott W. Crane
Madalin	Oldsmobile	C. M. Otis
Marlboro	Imperial	J. A. DuBois
Middleport	Detroiter	F. A. Whittaker
Millerton	Case	Millerton Garage
Mineola	Case	T. F. Roche
Monsey	Saxon	C. A. Johnson
New Glarus	Case	Hoesly & Hoesly
New Rochelle	Saxon	Tracy Rochfeld
New York	Lexington	Lexington Sales Co.
Oyster Bay	Case	Sagamore Garage Co.
Park Falls	Case	J. B. Saunders
Quogue	Case	C. W. Beery
Rhinebeck	Saxon	Turton & Snyder
Richland	Case	W. O. Paddoch
Rochester	Lexington	Pritchard-Lyon Motors Corp.
Schenectady	Imperial	Wideman-Niles Garage
Seneca Falls	Kissel	O. E. & E. J. Riegel
Silver Creek	Detroiter	F. B. Porter
Southold	Case	Southold Garage
Stevens Point	Case	Reliable Garage
Syracuse	Saxon	Shaw & Sissons
Utica	Detroiter	Henry & Morris
Waterloo	Detroiter	Iroquois Garage

North Carolina

Charlotte	King	A. Burwell

Ohio

Akron	Davis	L. P. Putt
Camden	Davis	J. E. Sizelove
Cincinnati	Davis	Bente & Ricke
Cincinnati	Lexington	Cincinnati Motor Truck Co.
Cleveland	Jeffery	J. H. Greenwald Co.
Cleveland	Chandler	Cuyahoga Sales Co.
Cleveland	Cole	Richardson Motor Car Co.
Cleveland	Paige-Detroit	Lucas & Christenson
Cleveland	Velie	Velie Motor Car Co.
Cleveland	Maxwell	Velie Motor Car Co.
Cleveland	Krit	Forest City Garage
Cleveland	King	Dunham Motor Car Co.
Cleveland	Moon	Dunham Motor Car Co.
Cleveland	Franklin	Eckenroth Sales Co.
Cleveland	Haynes	Cleveland Motor Car Co.
Cleveland	Hudson	Hudson Stuyvesant Co.
Cleveland	Apperson	Eisman Automobile Co.
Cleveland	Imperial	Eisman Automobile Co.
Cleveland	Lewis	Eisman Automobile Co.
Cleveland	Dodge	Neighbors Motor Co.
Cleveland	Milburn	H. D. Haupt
Cleveland	Reo	Auto Sales Co.
Cleveland	Saxon	Euclid Square Supply Co.
Cleveland	Ohio	H. D. Haupt
Cleveland	Briscoe	Empire-Briscoe Co.
Cleveland	Empire	Empire-Briscoe Co.
Cleveland	Chalmers	J. H. Greenwald
Cleveland	Milburn	H. D. Haupt
Columbus	Lexington	F. Mayer & Son
Covington	Davis	J. B. Kindell & Son
Dayton	Davis	McCain Realty Co.
Dayton	Davis	G. T. Foster
Dayton	King	W. C. Wampler
Greenville	Davis	J. M. Warner
London	Davis	Herbert Harper
New Lexington	Buick	C. C. Dillow
Toledo	Saxon	G. R. Ford
Toledo	Grant	Grant Motor Sales Co.
Wapakoneta	Ohio	F. M. Bowers
Wapakoneta	Maxwell	F. M. Bowers
Waynesville	Davis	Rogers & Son

Pennsylvania

Allentown	Detroiter	I. N. Miller
Allentown	Imperial	V. H. Steckel
Clement	Detroiter	J. M. Dunsmore
Cressona	Detroiter	H. E. Zerbe
Douglasville	Detroiter	J. C. Egolf
Galeton	Detroiter	O. C. Mosch
Gordon	Detroiter	Gordon Garage
Greensburgh	Davis	Penn Motor Sales Co.
Harrisburg	Detroiter	E. C. Ensminger
Hawley	Detroiter	Graham Watts & Son
Hazleton	Detroiter	W. Oelwine & Son
Kingston	Detroiter	Keystone Motor Car Co.
Lebanon	Detroiter	Lebanon Auto & Garage Co.
Lewisburg	Detroiter	F. H. Smith
Lewiston	Detroiter	J. M. Bratton
Lock Haven	Detroiter	J. S. Waite & Co.
Montoursville	Detroiter	A. L. Young
Mt. Union	Detroiter	C. S. Price
Pen Argyl	Detroiter	I. F. Batt
Philadelphia	King	Philadelphia Agency
Philadelphia	Davis	W. W. Gawthrop
Philadelphia	Milburn	Milburn Electric Car Co.
Philadelphia	Simplex	Thornton-Fuller Auto & Co.
Pittsburgh	Simplex	T. M. Pepperday Co.
Pittsburgh	Davis	B. C. Emerson
Pittsburgh	Davis	Kossler Motor Sales Co.
Reading	Detroiter	Star Motor Car Co.
Reading	Oldsmobile	Penn. Garage
Ridley Park	Detroiter	W. N. Erskine
Rimersburgh	Davis	J. I. Randolph
Scranton	Saxon	Lackawanna Automobile Co.
Shippensville	Davis	J. M. McLaughlin
Spangler	Saxon	Saxon Sales Co.
Towanda	Kissel	W. E. Dayton
West Newton	Davis	West Newton Garage Co.
Wilkes-Barre	Stearns-Knight	Deitrick Motor Car Agency
Wilkinsburg	Lexington	Central Garage Co., Inc.
York	Dodge	J. W. Richely Auto Co.

South Carolina

Lexington	Saxon	A. J. Fox

Tennessee

Memphis	Ohio	H. A. White Auto Co.

Texas

El Paso	King	J. E. Sullivan
Galveston	Saxon	C. Newding

Utah

Salt Lake City	Chandler	C. A. Quigley

Virginia

Richmond	Imperial	Alsop Motor Car Co.

Washington

Walla Walla	King	Moore Auto & S. Co.
Spokane	King	Moylan & Reilly Auto Co.

Vermont

East Burke	Detroiter	F. M. Davis

West Virginia

Clarksburg	Lexington	J. M. Shields
Huntington	Oldsmobile	C. T. Rabert
St. Mary's	Oldsmobile	G. K. Riggs

Wisconsin

Antigo	Maxwell	J. W. Hoefer
Antigo	Dort	Hessell Hardware Co.
Berlin	Dodge	Leachelt & Schweikle
Boscobel	Chevrolet	Olson & Kratochwill
Brandon	Regal	P. G. Dreger
Brandon	Ford	P. G. Dreger
Cedarburg	Kissel	Glen Rix
Delavan	Reo	W. H. Stewart & Son
Denmark	Dort	Kirwanek Bros. Co.
De Pere	Dodge	Toonen-Barlament-Wright Co.
Fall River	Case	A. E. Knaak
Fond du Lac	Chevrolet	J. D. Giddings
Fond du Lac	Dort	Clark Motor Co.
Fredonia	Dodge	E. C. Clauss
Green Bay	Sphinx	Hooker & Kittell
Green Bay	Dort	Du Bois, Haevers Co.
Green Lake	Ford	G. A. Hill
Green Lake	Overland	G. A. Hill
Lyndhurst	Chevrolet	Voelz & Boehm
Madison	Dodge	Madison Motor Car Co.
Madison	Moline-Knight	Madison Motor Car Co.
Markesan	Kissel	W. H. Wilson
Marshfield	Kissel	Hugo Wegner
Marshfield	Grant	Hugo Wegner
Mayville	Dodge	Pioneer Auto Co.
Milwaukee	Marmon	Hughes Motor Car Co.
Milwaukee	White	Wells Garage Co.
Milwaukee	Moline-Knight	Wait Automobile Co.
Milwaukee	Chevrolet	Frint Motor Car Co.
Milwaukee	Dort	E. F. Sanger
Neenah	Oldsmobile	Harvey Brown Agency
New London	Dort	Anderson-Dort Motor Car Co.
Oshkosh	Overland	Thom Automobile Co.
Oshkosh	Studebaker	Thom Automobile Co.
Oshkosh	Dodge	Thom Automobile Co.
Prairie du Chien	Franklin	L. Bushing
Stevens Point	Dodge	Auto Sales Co.
Sparta	Kissel	George Mannel
Westfield	Moline-Knight	Schauer Bros.
Whitewater	Moline-Knight	A. A. Coburn & Son

Wyoming

Rock River	Oldsmobile	J. C. Schork

COMMERCIAL CARS

California

Los Angeles	Koehler	W. S. Sparks

Colorado

Denver	Walker	E. M. Jackson

Connecticut

Hartford	G.M.C.	The Keeney Garage

Indiana

Batesville	Koehler	Meyer Hardware Co.
Shelbyville	Koehler	Carson & Morrison

Iowa

Cedar Rapids	Nevada	Blak. Auto Co.
Webster City	G.M.C.	Hanson & Tyler Auto Co.

Kentucky

Louisville	Republic	P. M. Andriot & Sons
Louisville	U.S.	Louisville Auto. Exchange

Massachusetts

Boston	Gartford	R. E. Taylor Co.
Boston	Rowe	E. F. Bunker
Boston	Willys-Util'y	R. E. Taylor Co.
Boston	Denby	Denby Motor Truck Sales Co.
Boston	Peerless	Beacon Motor Car Co.
Cheshire	Koehler	S. W. Curtis
Monson	Koehler	Monson Garage
Worcester	Vim	F. S. Howard

Michigan

Detroit	O.K.	Arthur Power

Missouri

St. Louis	Knox Tractor West End Auto Repair Co.	

New York

New York	Denby	Denby Motor Truck Sales Co.

Ohio

Cleveland	Kreba	National Garage Co.
Columbus	Koehler	Miller-Main Garage

Pennsylvania

Reading	Koehler	S. A. Stein

Tennessee

Nashville	Republic	Hatsfield Auto Co.

Texas

Houston	Vim	Magnolia Motor Sales Corp.

Utah

Ogden	G.M.C.	Fell-Wright Co.

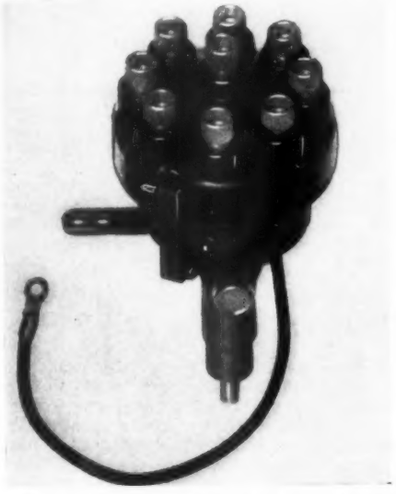
Virginia

Charlottesvil'e	Koehler	Charlottesville Hardware Co.

ACCESSORIES

Remy Eight Cylinder Timer

REMY equipment for ignition of eights follows the general lines of the four- and six-cylinder outfits, that is to say, there is one form in which the distributer is mounted separately, another in which it is combined with a coil and mounted on a pad to take the place usually occupied by the magneto, and the third which has the distributer mounted integrally with the generator. Each type is made with either manual or automatic spark advance, and it is pointed out that the automatic kind can be made to suit the needs of any particular motor.



Remy timer for eight-cylinder motors

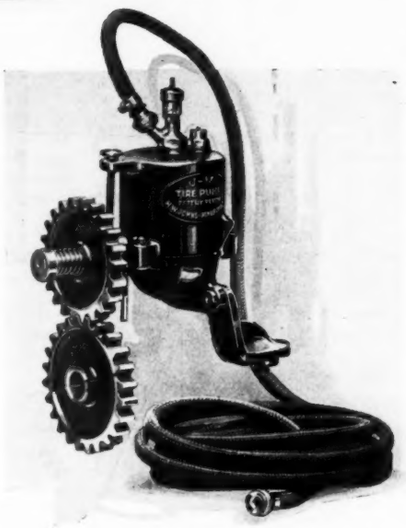
A Remy feature that has some good points is the fact that advance and retard are effected without moving the whole distributer, which means that the spark plug leads are not moved and shifting the spark lever cannot by any possible chance cause the wires to chafe.

The Remy company has an eight-cylinder magneto in preparation at present and expects to have it on the market shortly.—Remy Electric Co., Anderson, Ind.

J-M Engine Driven Tire Pump

This is a single-cylinder tire pump which, though small and compact, is said to be capable of inflating a 34 by 4 tire in 2 1-2 minutes and a 30 by 3 1-2 in less than a minute. The pump is 3 3-4 inches high by 3 inches in diameter and weighs 4 1-2 pounds; the bore is 2 1-4 inches and the stroke 7-8 inch. Cylinder piston and base are of fine-grained gray cast iron with the wearing surfaces ground; the connecting-rod is of steel; and the piston packing is of an asbestos material made especially for the purpose.

To minimize heating the intake and outlet valves are made extra large, and an automatic pressure relief valve is provided. This, blowing off at the pressure at which the tire is fully inflated, eliminates the necessity for a pressure gauge. Lubrication is effected by packing the pump with soft graphite grease, so that there is no liquid lubricant to work into the air supply.



J. M. engine driven tire pump

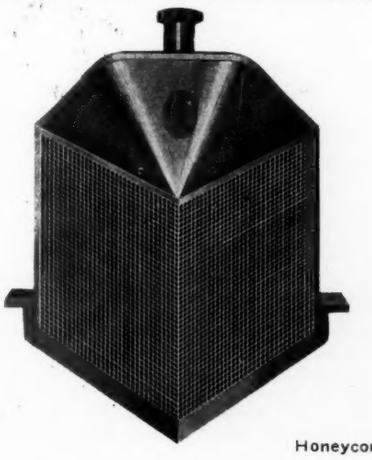
At present the pump is supplied for installation on Fords, Overland models 79-80, Buick models 24, 25, 36, 37 and 56, and all Reos except the late 1915 models. Brackets for other cars will be added. Installation is simple, requiring no machine work and no readjustment of any part of the motor. A split gear is furnished which is placed on the crankshaft of the motor and drives to a gear on the pump shaft. The pump gear slides into and out of mesh, a coil spring normally holding it out.

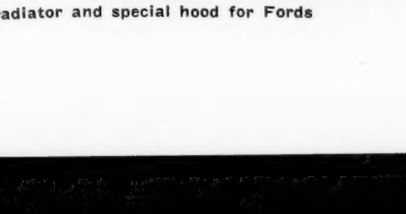
The price of the pump complete with gears and air hose is $7.50.—H. W. Johns-Manville Co., New York City.

Special Ford Radiator

The illustrations below show a new hood and radiator for Ford cars, these two fittings being made in two different patterns to suit 1915 Fords and those previous to 1915. Both radiators are of honeycomb construction following the usual Livingston system which carries the water round three sides of each air tube, the flow being both horizontal and vertical. They can be had with a flat front or pointed, the only difference in fitting being that the latter type needs an extended starting crank for the motor which is given with the pointed radiator without extra charge. The use of corrugated tubes in the radiator is said to allow some freezing up without damage, as the natural spring allows for the expansion. The flat radiator costs $35 and the pointed type $40.

The hoods have ventilating slats and they attach to the standard Ford hooks so only a screwdriver is necessary to change from the old to the new. It should be added that the hoods do not necessarily go with Livingston radiators as they will fit equally well on the ordinary Ford radiator. The hood is cheap, costing $8 finished in black enamel.—Livingston Radiator Mfg. Co., New York City.

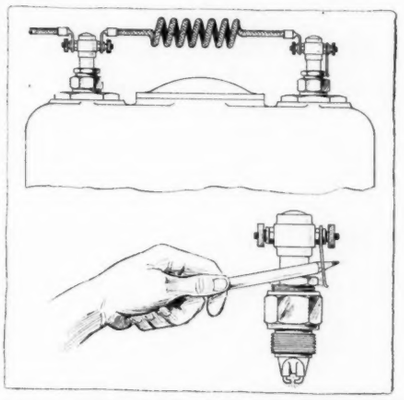




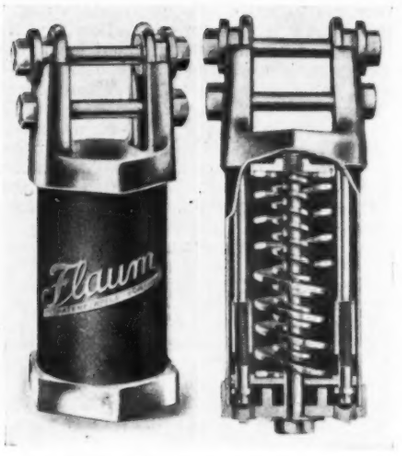
Honeycomb radiator and special hood for Fords

Double Pole Plug

The "Peco" is a spark plug with two insulated electrodes, and it can therefore be put in series with another plug so as to give a two-point ignition. It has as another feature a special sort of porcelain which is carried well down into the combustion chamber and is shaped like a wedge, being thus freed from hollows likely to accept accumulations of carbon or oil. It is claimed that this wedge-shaped extremity is cleaned by the action of the flame of explosion, and that it is practically impossible to soot the plug. There are, of course, two terminals instead of the usual one, so when the plug is to be used for single-point ignition a small brass blade is attached to one ter-



Peco double pole plugs showing series mounting and use of side blade for testing spark



Flaum shock absorber with double spring for heavy cars

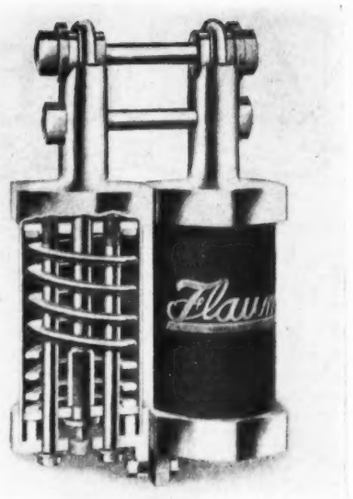
minal, with its lower end touching the plug body. This can be used as a spark gap for testing the source of current by inserting the point of a pencil between the plug and the blade and lifting it away from its contact with the plug body. Two-point ignition has shown increased power on a good many motors, and this plug makes it easy to try out because all necessary is a set of plugs and enough wire to make the bridges across from one plug to the other in each cylinder. The plug sells for $1.25.—Power & Efficiency Co., Trenton, N. J.

Adjustable Shock Absorber

To shock absorbers of the supplementary coil-spring type there seems no end, which shows that this apparently simple accessory is capable of a great deal of refinement. One of the most recent additions to the range is the Flaum, which comprises a compression spring contained within a cylinder, the spring being readily adjustable from outside. For light cars a single spring is employed, but two concentric springs replace this when the chassis is exceptionally heavy. Besides the adjustment for the spring to give the requisite ease of riding to suit the car and the road there is also an internal adjustment to permit the absorber hangers to be altered in height to suit the original springs of the car. Either single-cylinder or twin types are obtainable, and the prices vary from $15 to $30, according to to size.—Flaum Shock Absorber Co., New York City.

Large Tube Spanner Kit

No automobile can be considered well equipped without a set of tubular spanners; but the kit illustrated below is not intended for use on the road. As a complete outfit for a garage it should be extremely useful, as it would surely be difficult to find a nut on any kind of car that could not be tackled with some portion of this compendium of spanners. The whole kit with its case sells for $60. —Walden Mfg. Co., Worcester, Mass.



Twin pattern of Flaum shock absorber

Catalogue and Pamphlet Review

To Prevent Belt Slip—Sticky compounds are usually employed to give belt adherence to ordinary pulleys, but there is an alternative which consists in covering the pulleys with a leather-like substance, and this is claimed to give driving grip without "stiction." The process is simple and a recently published leaflet describes it fully.—Gripwell Pulley Covering Co., Hollis, Long Island, N. Y.

Exide Batteries—Motorists who want to keep their batteries in proper condition must treat them intelligently, and to do so it is necessary that they understand them to a limited extent. Manufacturers, on the other hand, in choosing battery equipment for their cars, want to know the why and wherefore of different kinds. Both user and automobile maker will find much information along these lines in the latest Exide catalogue, which is very complete in detail information.—Electric Storage Battery Co., Philadelphia, Pa.

Tire Wisdom—The care and repair of tires is a never ending subject, and its importance will last just as long as the pneumatic tire itself. A tire is unique amongst automobile parts in that it is expected to wear out rapidly and the worst of chassis is reckoned equal to the destruction of a good many sets of the very best of tires. It is probably true that a poor tire used properly will give as good service as a good tire used stupidly, and it is also likely that most motorists through ignorance of what it pays to do with tires, never get much more than half the possible mileage from a set of tires. Thus a booklet telling in simple, terse expressions how tires can be abused by lack of thought is bound to be of value to any one who will spare the time to read it. Everything, from the choice of a tire down to the repair of little injuries in an intelligent manner, is contained in a Firestone book, "Care and Repair of Tires," and it is illustrated so well, with such carefully chosen wording, that any one could gain much useful knowledge from it. Half an hour would suffice to read it through and grasp the principles it teaches and it would be a half hour well spent. The book is not an advertising pamphlet, but a really useful addition to a motorist's library.—Firestone Tire & Rubber Co., Akron, O.

New Tops—A new top would seem a difficult thing to order by mail except

Walden tube spanner garage set

from the maker of the original one, but it is really only a matter of measuring up the old top properly. A firm who specialize on top making have got out a form in which a typical top is illustrated and all the necessary dimensions marked in red—after the fashion of a tailor's self-measurement form. With this aid it should be possible for almost any one to order a new top with confidence.—Buob & Scheu, Cincinnati, O.

Windshields—It is not often that we receive so practical a catalogue as that which deals with Vanguard windshields, nor one that is more imposing in appearance. Externally it is a plain brown cover devoid of printing, and some 14 inches square. Inside there are five sheets of excellent half-tones showing the manufacturer's plant, and then follow 14 sheets of genuine blueprints giving all the styles and patterns of shields and showing the method of fitting. The angles through which the hinged parts turn are marked and the scale is somewhere about half actual size. The book would appeal much more to the manufacturer or dealer than to the private user, but it is not, of course, intended for the latter.—Vanguard Mfg. Co., Detroit, Mich.

Comfortable Roadside Meals—It is possible to enjoy a meal taken by the roadside, but it is not to be done without due forethought. For the tourist, means to provide really appetizing food that will not seem a makeshift spells better health and also saves money. Just now every one is thinking of the summer tour, so the full consideration of car commissariat is timely. It is easy enough to cook as well as to eat in comfort on a car if one has well designed apparatus to combine lightness and efficiency. How this can be done is the subject of an interesting little volume recently issued by —Prentiss-Wabers Mfg. Co., Grand Rapids, Wis.

Radiator Leak Stoper — A new compound which is claimed to stop leaks in a radiator by dissolving in the water and solidifying out as it escapes to the air is called X. It is claimed also to remove scale and so help cooling, while it is said to have no deleterious action upon either metal or rubber.—X Laboratories, Boston, Mass.